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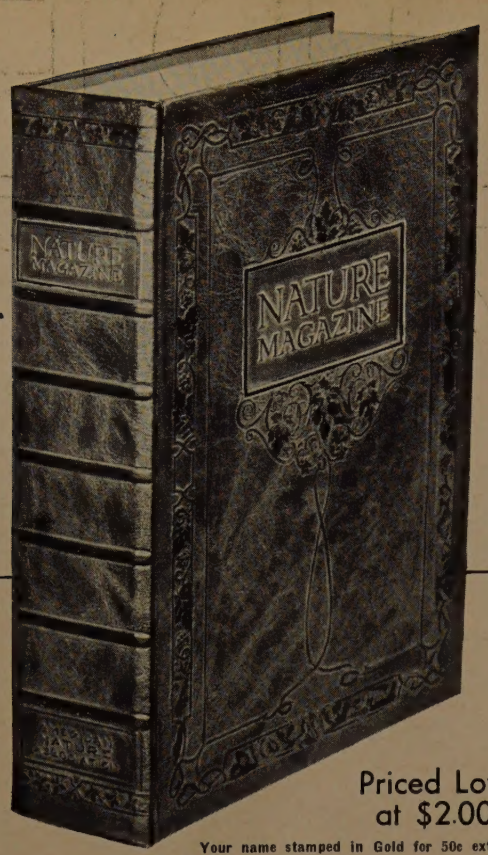

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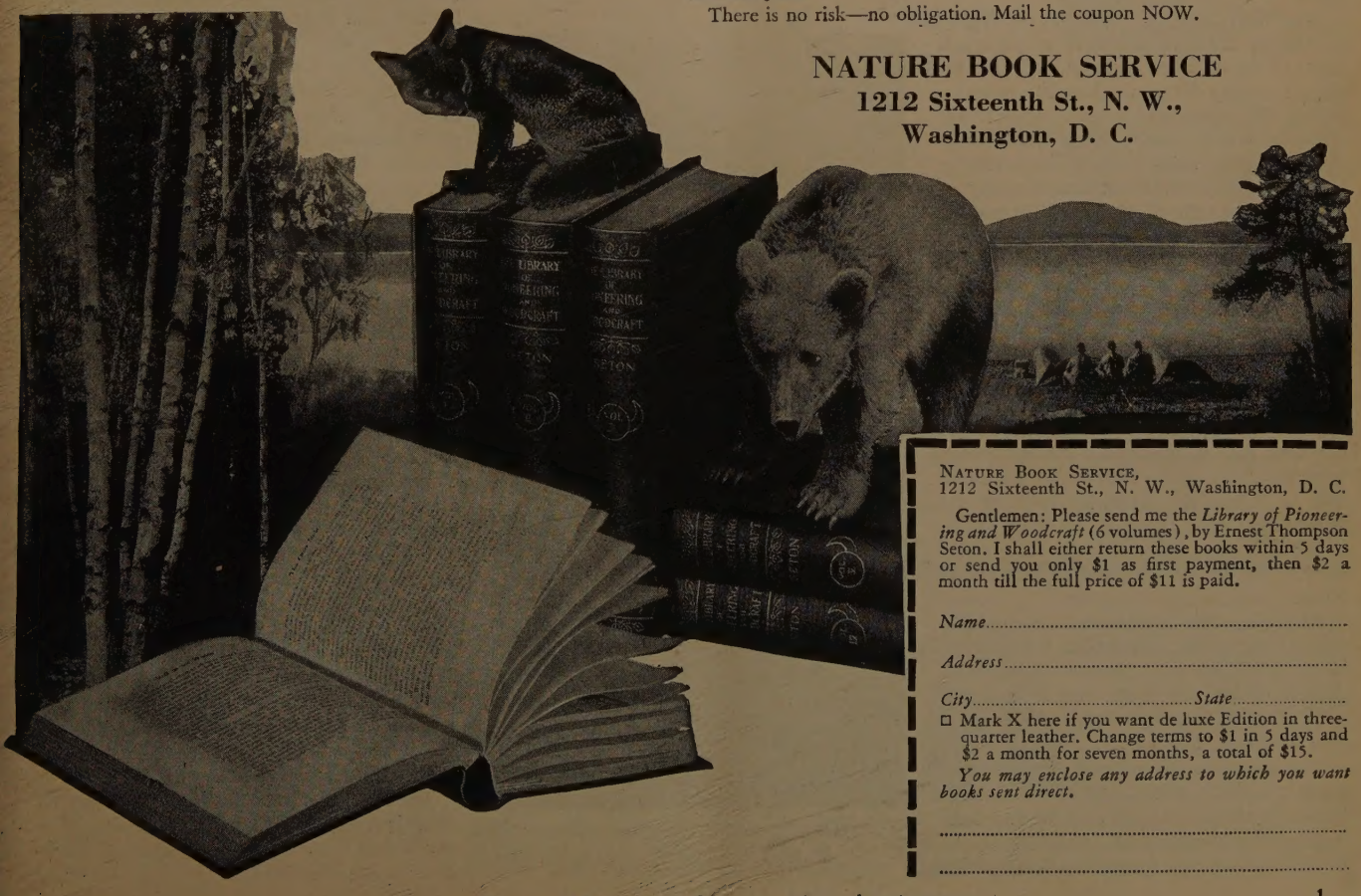

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THE PHOTOGRAPHING OF SMALL ANIMALS IN OBSERVATION CAGE

BY MARION STAPLES HALLER

The photographing of small, active animals, so nimble that they are able to evade even visual observation of their daily life, is a problem that besets many a naturalist. In fact, it is easier to capture these small creatures bodily for temporary study, than it is to "catch" them with the camera!

So many Nature study enthusiasts enjoy recording their adventures with wild-life and proving their tall stories afterwards with convincing photographs, that they may find useful a simple photographic arrangement, evolved from necessity, which has proved of inestimable value in making such pictures possible.

One of the illustrations that resulted from our experiments with a "Window Jungle," described in the January Nature Magazine, was one of a portly frog with a large loop of earthworm, like unmanageable spaghetti, protruding from his mouth. This informal portrait of an amphibian epicure was made possible by installing the frog in a simple, home-made observation and photographing box for the purpose. This box was fifteen inches long, four inches deep, and fifteen inches high, with a clear glass front and the other three sides and floor made of upson board.

Moss and ferns, or whatever setting is suitable as the natural habitat of the small creature to be photographed, can be arranged realistically in the box before introducing the active and elusive subject. Because this box is so narrow, the whole range of four inches from front to back can be brought in focus without the necessity of stopping down the diaphragm, thus making possible a short exposure. By this simple means, the photographer may be assured that his wild-life subject is in focus, no matter how temperamental or frisky it may be.

The clear glass front to the cage gives the small captive a feeling of freedom in spite of his cramped quarters, so that, strangely enough, he does not feel cornered or caged, and is soon quite content to eat, wash his face, or investigate his surroundings in leisurely fashion. In focusing the camera, this glass front can be made totally invisible on the ground glass and in the finished picture by having it slightly out of focus.

With the small creature to be photographed installed in this simple cage, it is possible to get a characteristic portrait of him with the use of daylight if the cage is outdoors, or photographic lamps or photoflash, as the case demands, indoors.

The miniature proportions of these small subjects make it essential to obtain as large an image of them as possible. With a folding camera, the portrait attachment is invaluable; with larger cameras, the extension bellows should be utilized to their limit, so that the resulting portrait will be nearly life size.

On a photographing excursion to the woods, it is quite possible to take this cage along and make your portraits along the way as you meet interesting subjects. This eliminates the necessity of making a second trip to return your subjects to their home, but the results are usually poorer; perhaps because of make-shift, hurried conditions, or the resultant nervous wear and tear of combining the capturing of the subject and then photographing it before regaining one's composure.

A PICTURE OF SUN RAYS THROUGH SMOKE TAKEN BY M. HUKILL, CARTHAGE, MO., AT 4:30 OF A SUMMER AFTERNOON

An Interesting Question on Photography

Photographic Editor: I should like to know how to take close-ups of plants. I have read the article on insect photography in the May, 1933, issue of NATURE MAGAZINE, and I am very much interested in taking close-ups. Also, how do you take close-ups of animals and birds?

Answer: It is a little hard to advise you specifically, because I do not know what kind of a camera you have. It is best to have a camera with a long bellows or with a little extra lens which fits over your regular lens and is known as a portrait attachment. You then need to set up the camera, focusing very accurately on the flower or plant. Most photographers find it advisable to use a camera that will permit ground glass focusing, in order to be sure of the distance. The closer you come to an object, the more accurately it is necessary to focus. Remember that everything even a very short distance nearer to or farther from the lens of the camera will be very much out of focus in the finished picture. It is, therefore, best to use an artificial background of white or black cardboard or cloth. In this way the individual plant can be made to stand out much more clearly.

Close-ups of animals and birds may be taken in much the same manner. Suppose you have a bird nest outside your window. You set up your camera close to the nest on a ladder tied to the tree, on a tripod inside your room, or in whatever way seems best. You focus it accurately on the nest, feed box, or piece of suet—or whatever you are using to attract the bird. You set the shutter and then retire to a distance to watch, having tied a thread to the shutter release. With wild animals and birds, it is best to leave the camera in position for some time, so that they may become accustomed to it before you actually try to take the picture. This will save you much waiting.

The other method of taking close-ups of animals or birds is with a telephoto lens, which has been discussed at various times in NATURE MAGAZINE.

Nature Photography

There have not been many books on Nature photography and most of these have been elaborate and expensive as well as excellent. Now comes a volume which is less expensive. It is *Nature Photography* by Oliver G. Pike. Here is a practical book, profusely illustrated with ample evidence of the author's mastery of his art. There are chapters on big-game photography, marine photography and low-power microscopy and plant photography, written respectively by Major Radclyffe Dugmore, F. Martin-Duncan and E. J. Bedford and illustrated by the authors. The whole is a valuable volume. It is published by the American Photographic Publishing Company, 428 Newbury Street, Boston, Mass. The price is three dollars.

Magazine Reading

The *Royal Road to Learning* by Miss Gertrude Charney contains some excellent ideas, well and cogently put, on the value of a selected group of magazines as a means to the profitable use of leisure time. It offers a highly practical method of adult education, one of the greatest needs of the present day. The wider and wiser use of reading hinges upon the encouragement of a wider and wiser use of time by people. The object of Miss Charney's plan is the encouragement of a larger horizon of interest in life and a keener understanding by the intelligent use of a select list of publications by cooperative, story telling, magazine exchange groups. The plan is unique, far reaching in principle, with interesting social implications. The first reaction one has in reading this book is "that there are so many magazines; that one can learn so much from them; and that there is such a great difference in character and quality." The book deserves to have a large sale. Copies may be secured from our own Book Department or the publisher, Miss Gertrude Charney, 6972 Greenview Avenue, Chicago, Illinois, at $2.00 per copy. H.E.R.

For Star Gazers

An interesting and valuable book for the amateur astronomer is *Other Worlds* by Edwin Lincoln Moseley. Here is presented a simple and concise picture of what is and what happens in the heavens. Beginning with meteors, the nearest of all celestial bodies, the author proceeds by way of the moon, planets and sun to the remoter galaxies. In this way he orients the reader to the conception of the earth and its cosmic relations and avoids confusion from the start. He deals with known facts rather than with speculations and theories about the universe. This volume is one in the "New World of Science Series" edited by Watson Davis and published by D. Appleton. It sells for two dollars.

Ohio State Bird

Although raised to the eminence of State Bird by popular selection some time ago, the wren has been toppled from its pedestal and the cardinal given the honor. This is by action of the State Legislature and reflects the action taken by certain groups in the State. Lists of official State Birds should be corrected accordingly.

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FRIENDS OF WILD LIFE—ORGANIZE!

THIS is an appeal to the true friends of North America's wild life.

All who give serious thought to the subject know that a few species have been totally destroyed, and that many others are steadily becoming more scarce. The demands of a rapidly increasing population, aided by an unprecedented wealth of mechanical invention, have brought these reverses. It is doubtless true that the general advance of culture has kindled a degree of appreciation of Nature's beauty and bounty that far transcends in volume that of former generations. Why, then, has wild life so suffered? Making all due allowance for the unfavorable influences that occupation of the land by man has brought to wild life, we must conclude that lack of understanding, and greed, have played major rôles.

All wild creatures suffer from unfavorable weather, local and seasonal dearth of food, natural enemies and disease. But our original teeming wild life populations were built up under all these handicaps, and their natural enemies were formerly much more numerous than at present. These are conditions that have always surrounded all organic life, the world over. Does not the presence of these deterrent forces emphasize man's duty to protect his wild friends?

Each state has an organization of some kind that in many cases is the only statewide agency equipped to protect wild life in general. These organizations are financed mainly by fees from hunting licenses. Some are more or less political in make-up, and in many cases they are short-lived. Naturally, they vary greatly in methods and efficiency. Some grant privileges out of all proportion to the existing stocks of game, resist the imposition of necessary restrictions and virtually compete with one another in reducing a resource that belongs to all of us. In some cases methods are permitted that are so destructive that they have earned the contempt of many of the sportsmen as well as of all citizens who take an intelligent interest in the ultimate fate of America's wild life. Some are managed by leaders possessed of great ability and high ideals. The well-informed student of wild life conditions in each state knows the faults and virtues of his conservation commission, and has both rights and duties.

One result of the present conditions has been an appalling decrease in many of our wild species, especially our larger game and non-game birds. Let us consider the status of a few. Those classed as game fall into two general classes, migratory and resident. Migratory game birds include principally the waterfowl and shorebirds. Being raised mainly in Canada, and killed mainly in the United States, their fate is plainly of continental concern. Resident species comprise mostly the grouse, quail and wild turkey. Some of these are so wide-ranging that their claim to continental interest is indisputable, for no species can now find sanctuary in seclusion.

Each year we see our beautiful and interesting game birds grow pitifully fewer. Our ducks and geese are so reduced that not more than a dozen individuals, on the average, are now killed annually by each hunter, even with the help of baiting and enticing by live decoys of their own species, two methods that are thoroughly unsportsmanlike and indefensible.

In some states the average bag of woodcock for the season is less than one bird per hunter. In others, where concentrations occur, the toll paid by this vanishing species is tremendous, and often in almost open defiance of federal and state laws. The Wilson snipe, formerly so abundant that a single gunner boasted of killing nearly 78,000 (366 in one day) is steadily growing rarer, in spite of the vast extent of its northern breeding grounds. Over great areas our ruffed grouse, prairie chicken, sage grouse and others have all but disappeared. Even our bobwhite, beloved of the farmer, is fast dwindling, in spite of reduced seasons, transplanting and importation. Our beautiful and harmless mourning dove must still endure high bag-limits and long seasons, sometimes while nesting.

In addition, our hawks and owls, herons, cranes, kingfishers, pelicans, the larger woodpeckers, and many others are being brought closer each year to extermination; some through defiance of protective laws, some from widespread prejudice or ignorance, some merely because they afford living targets. Protests from Nature lovers, even when these are backed by scientific proof of the economic worth of the victims, are ignored and flouted by the destroyers. This catalogue of persecuted creatures and indefensible practices is only begun, but why continue?

What is the remedy? We believe that the situation demands that the real friends of wild life bestir themselves in its behalf. An executive of a nation-wide sportsmen's organization recently stated his conviction that at least two-thirds of the seven million hunters have never heard the term "game conservation". This is a majority of the very people who, we are told, are the only ones who are doing anything to help the game. Let them now hear about conservation, not only of game, but of other species, and let them hear it from those who believe conservation means mercy and preservation for wild life and regard for the rights of others. Not all so-called conservation agencies work on these principles.

Let the true friends of wild life form militant organizations in each state to combat the growing evils inherent in the granting of special killing privileges. In each state may be found leaders familiar with local needs who will ably direct movements to formulate and pass helpful laws, and to combat destructive ones. There are many nature clubs, humane societies, farm organizations, women's clubs and local Audubon societies whose members will surely help in such a movement. Let each organization work freely with any agency that is convincingly working to preserve wild life. But let each be ever on the alert to avoid alliances that will throttle and nullify its efforts. Remember that the destroyers are well organized, and that some carry false banners.

Only by mapping a clear trail, and by following it consistently, can success be gained. Victory may await the end of a hard battle, but if this be intelligently waged, it surely will be won. Let us all work together for wild life.

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NATURE MAGAZINE

VOLUME 22 JULY · 1933 NUMBER 1

WHEN NATURE GOES ON THE AIR

A PEEK BEHIND THE SCENES IN THE BROADCASTING STUDIOS

BY DOROTHY E. PLETCHER

THUNDER crashes. Rain descends noisily. Another clap of thunder. The wind shrieks and moans and whines. Huge waves slap viciously against the side of the ship. What a night! We involuntarily shudder.

Don't be alarmed. It is only a radio storm, manufactured in the studio. Back in radio's pioneer days, engineers quickly comprehended the need of scenery for a realistic radio performance. That is how they began creating hundreds of different sound effects. Today their knowledge of imitating sounds is nothing short of amazing.

How does the radio get its Nature sound effects? There are four ways. Occasionally a studio arranges for an unusual broadcast by having real animals or birds or the elements register their own sounds before the microphone. Second, sounds of the outdoors are recorded on film or phonograph records and thus used over and over again. Third, engineers construct mechanical devices which give a very close imitation of the actual sound needed. And fourth, a studio may have in its personnel someone exceptionally gifted in imitating birds and animals.

When wild life broadcasters actually go before the microphone, the world never fails to sit up and listen. Quite a stir was caused when the roars of the animals in the Bronx Zoo were put on the air by the National Broadcasting Company, after being picked up in the zoo by a portable transmitter, carried from one animal house to another. Animal roars from the circus in New York City were also broadcast to thrilled youngsters far and wide.

And did you hear "Short", the wire-haired fox terrier barking his bark round the world? Starting from WGY, the General Electric Company's studio in Schenectady, his bark went by short waves to Holland, where it was relayed to Java, then to Australia and back to Schenectady, a distance of approximately 24,000 miles.

THE BARK HEARD ROUND THE WORLD

"Short", a wire-haired fox terrier, started the bark from WGY, the General Electric Studio in Schenectady. Hearing his own bark come back through a nearby loudspeaker, the canine broadcaster thought he was being given an argument and kept right on barking

BEHIND THE SCENES AT NBC'S CHICAGO STUDIOS

This gives some idea of the intricacy of sound effects. The large cylinder at the left is a wind machine. The other gadgets make the sounds of a locomotive engine. Mr. H. G. Ashbaucher, chief of sound effects, wields the pick-axe at the right

A Boston studio can testify to the strain of dealing with erratic wild life broadcasters. The guests invited to the studio to watch a live lion broadcast, whole-heartedly longed to be elsewhere when Leo began bounding playfully through the studio's glass partitions and making his way out to mingle with the audience. The latter lost no time in vanishing down hallways and around corners.

Undoubtedly these spectators fervently wished that the popular phonograph records of animal roars had been used. These records are secured with a portable recording apparatus which is taken hither and thither on a truck. A pleasing assortment of Nature's noises are thus recorded by various firms who sell them to the studios, where they are broadcast. Some studios, however, preferring to manufacture all their sound effects, never use records.

In looking through a pile of sound records, I found these titles: "Animals (wild) as heard in zoo"; "Blizzard—howling winter wind"; "Frogs—numerous small frogs croaking, with large frogs in distance"; "Hippopotamus—roars"; "Thunder and rainfall".

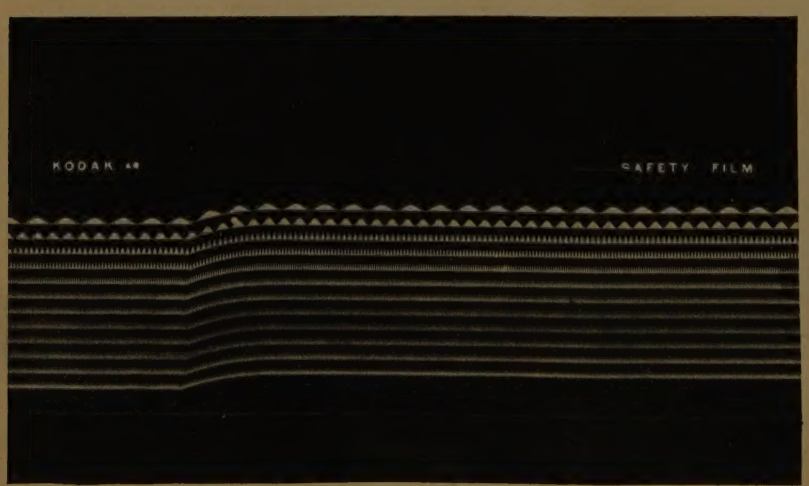
All of the big moving picture studios send out sound trucks equipped with microphones to record on rolls of film the noises of Nature and her birds and animals. These are stored in tin cans, ready to be "mixed" with actors' dialogue and other sounds. Many feet of film have been exposed to catch just one good peal of thunder.

And, in the future, each broadcasting studio will be doing likewise. Even now, WGY has a film recording machine with which it plans to build up its own library of sound effects. This machine, the only one of its kind, is a development of the Research Laboratory of the General Electric Company.

On this extraordinary film the sound is transformed into light and shadow. The silver tracing or stripe of light shown on the film is reproduced as sound through the medium of a photo-electric tube, which is very sensitive to changes in light intensity.

When this equipment, which has other uses than radio, becomes portable, radio men will be busy outdoors canning Nature's sounds at their sources. The studio director will be saying to the sound effects librarian: "Frank, get out a can of thunder, two cans of hyena laughs, three cans of lion roars and one can of cricket chirping."

"One day a client who sells chickens wanted the cackling of hens as a realistic background for his program," relates a WGY man. "We decided to use our recording equipment. A dozen hens were brought to the studio and corn was scattered before them. We connected the microphone to the sound



A SOUND FILM USED AT STATION WGY

Sounds are transformed into light and shadow on this film which will be stored in a little tin can as part of a library of sound effects. The film is used by WGY's film recording machine, a development of the Research Laboratory of the General Electric Company. This machine is the only one of its kind

WATERFALL, WIND AND RAIN

The tub in the foreground is a waterfall, rattans on the motor moan like wind and the drain pipe makes a plane roar. Helen Earle pours sand on cellophane for rain and Urban Johnson slaps leather with a stick for shots and crunches shoes on a pan of breakfast food to make the sound of footsteps

recorder and every nuance of cluck and cackle traced a design on the film. However, every time a hen picked a piece of corn from the floor, there was a report. And the record, when reproduced, sounded like a very fast tap dance on a barn floor. We solved this problem by scattering the corn on a blanket. Now we use the film for these broadcasts."

In Boston, at WEEI, the Edison Electric Illuminating Company's station, Lloyd G. Del Castillo does remarkable animal imitations on the organ. He uses the "theatre" organ which developed in the last twenty years for synchronizing with the silent movies.

"This organ," says Mr. Del Castillo, "is much more flexible than the conventional church organ. With its percussion section containing bells, drums, and various sound effects such as sand block, wood block and bird whistles, it is possible to imitate practically anything.

"By smearing the hand on the keyboard I produce a rain effect with a thin sounding string tone plus the snare drum roll and the sand block," he continued. "Thunder is achieved with low heavy pipes plus the bass drum roll. The roar of any large animal is accomplished with a heavy mixture of low pitched stops. Smearing with a downward rocking motion of the hand gives a dog bark; an upward rocking produces a yelp.

"The cat meow? It is made by a short chromatic run on a thin sharp reed tone. The same stop produces a duck quack by striking four adjacent notes in the middle of the keyboard, or a pig grunt by doing the same thing at the bottom of the keyboard. Most bird calls are done with a high flute stop. The wind? Long sweeping glissandos on the flute are the answer. Perhaps the most difficult imitations I've encountered were the horse neigh, the donkey bray, and the rooster crow."

And what of the bewildering mechanical devices with which Nature's sounds are simulated? Radio noise making, be it known, requires countless instruments. Because

PURVES PULLEN, STUDIO MENAGERIE

Over Station KDKA, Pittsburgh, this young man has become famous for his imitations of birds and animals on the air. He has been mimicking since childhood and has a large repertoire

it is not always possible to discern the use of a gadget by its appearance, all sound effects are labelled, catalogued, and given a permanent place on a shelf in the sound effects room.

At WGY a forest fire becomes very real when a plumber's blow torch is held near the microphone. The breaking of wooden match sticks, at the same time, conveys the sound of crackling timbers.

A great variety of noises come from WGY's sound cabinet. This marvelous device, which looks for all the world like a radio, was invented by a trap drummer in his spare moments. From it will emanate as startling a lion's roar as one could desire, a dog's bark, swishing surf, howling wind, and what not.

A SCENE FROM ONE OF THE "MARCH OF TIME" PROGRAMS

Behind the piano is Mrs. Ora D. Nichols, who invents sound effects for the Columbia Broadcasting System, with two aides. Here they are engaged in producing the rumble of a truck, machine-gun shots and a heavy fall of rain. A wooden cylinder, a cylinder of slats and something that looks like a roll of player-piano music make the respective sounds

From NBC's Chicago studios, we hear rolling waves on the sea shore. An investigation discloses two stretched drum heads on each side of a barrel hoop. Crushed rice between the skins gives the effect of the waves. And the swish of surf? Someone is rubbing a scrub brush on a screen. Another studio gently rubs two pieces of sandpaper together—and we'd declare we heard lapping waters on the shore. A Canadian station makes its surf by tipping a large flat sieve filled with peas, from side to side.

And now it's raining. For this—we're still exploring NBC's Chicago studios—rice and small gravel are dropped into a funnel to which a three-foot hose is attached. From the hose the rice and gravel fall into a box filled with crumpled paper. Some studios pour sand on cellophane in manufacturing their rainy weather. Others produce rain with a shower of water from a spraying machine on canvas. Pouring salt on a lettuce leaf also makes a splendid shower. A running brook is usually effected by a series of short troughs down which trickles the water from a hose attached to a faucet.

Now thunder rolls threateningly. A ten by four-foot piece of tin is being rattled on a carpet. And the wind is howling. Instinctively we turn up our collars. A four-bladed fan with arms one and a half feet long—a reed is attached to each blade—is driven by a small motor. The velocity of the wind is controlled by a rheostat. But should you desire a storm, a hurricane or a tornado, you'll find compressed air being blown through a metal tube, one foot long and two inches in diameter. Twelve miniature sirens are fastened to the tube and the number turned on is according to the required strength of the storm. Really, the sound would put an actual blizzard to shame.

An old way of simulating wind was by revolving a large cylinder from which hung a piece of weighted canvas. As the canvas rubbed against the wooden slats on the cylinder, the wind began its wail.

How the fire crackles in the radio's forestry act! Cellophane is being crumpled before the microphone. And if the fire grows larger and spreads to a neighboring forest, Mr. Herman G. Ashbaucher, chief of sound effects at NBC's Chicago studios, brings out the wind machine. This time, instead of reeds, he puts gummed paper on the blades to make the rumbling background. And he crushes strawberry boxes for the cracking of the fire. Would you believe it? He uses so many strawberry boxes every day that he buys them by the wagon load.

But wait! A dam has been dynamited and the raging torrent is destroying everything in its path. A stupendous affair! Shall we peep behind the scenes? Ah, a shower-bath attachment, connected to a compressed air tank, is directed into a wash tub standing on end in a large "mud box". In the tub are stones and gravel. The air bubbles through the water and throws the stones and gravel against the tub—and there's your raging torrent.

You wish to hear these faked Nature sounds? Then listen in on the Rin Tin Tin Thrillers, Forest Ranger, during the Thursday Farm and Home Hour, Thurston the Magician, and the Young Forty-niners from NBC's

Chicago studios, or a number of other popular hours.

Some time ago the Canadian National Railways network, now controlled by the Dominion Government, produced the play "Henry Hudson". With its difficult Nature sounds—they were used both as atmospheric background and as direct motivation to the plot—it was particularly arresting. In the studio were manufactured the sounds of the grinding and crushing of huge masses of ice, the beat of ice-laden waves against the ship's timbers, and the lap of the water against the sides of the tiny shallop in which Henry Hudson and his followers were finally cast adrift. At the end of the play we heard the winds scream terrifyingly and the waters splash in the darkness.

"The only Nature sound that ever stopped us for a long time was the grinding of ice in the Arctic," confesses the Canadian Marconi Company. "We finally got it by blowing up toy balloons and rubbing our hands over them."

At KMOX in St. Louis one day they were up against it for a mine explosion. Although a kettledrum is used for this ordinarily, the one at the studio had been damaged. In the midst of this dilemma there came to the control room the sound of a terrific explosion. It was really devastating. Someone, it seems, had jokingly blown some pepper near a man rehearsing his lines before an open mike. He sneezed. That was the perfect explosion.

By experimenting at KMOX they discovered that by simply blowing the breath rather forcibly into the microphone, anything from the roar of surf thundering on the beach, to the explosion of a gunpowder factory, can be faked, and most effectively.

At KDKA in Pittsburgh they pull animals' roars, not out of the proverbial hat, but out of a bucket, so to speak. "We have a contrivance in the shape of a large wooden bucket, the bottom being made of the same material as the head of a bass drum," they relate. "A hole in the middle of the bottom allows room for a very tough piece of chemically treated cord which stretches to about three feet in length. On this cord there is a piece of canvas so attached that it will move up and down slowly.

"Turn the bucket upside down. Put your foot upon the handle, draw the cord tight with one hand, and then with the other, move the piece of canvas up and down. After very painstaking practice you'll be having lions and other assorted animals roaring with dismaying realism." A number of studios depend on this technique with an amazing versatility to make their animals roar.

Horses' hoof beats seem inordinately popular. Does your radio play require plodding mules and milk wagon horses? Just knock sink plungers together. Or do you need the stage coach and galloping horse type? Then rap mallets on a plush-covered piece of wood. Or, perhaps you must have the plop-plop of horses' hoofs in the mud? Well, a clever young man makes that sound with his mouth. Apparently just anyone can't "plop-plop" convincingly, either.

Perhaps you've wondered how a dog's tail thumps on the floor so obligingly at the right moment? That is someone standing close to the microphone, slapping his temple with his index finger. It hardly seems possible!

LETTING THE WORLD HEAR THE ROAR OF THE LION

There is no "mike fright" with these two lion cubs at the Bronx Zoological Park and they are putting on a fine assortment of growls for the radio audience. Dr. Claude W. Leister, Curator of Educational Activities at the Zoo, is acting as master of ceremonies and NBC supplies the air lanes

In New York City, at WABC, I met a clever young woman whose business it is to invent sound effects for the Columbia Broadcasting System. She is Mrs. Ora D. Nichols.

When I called on her at her den of magic she introduced me to her inventions stored in huge cabinets lining the walls. Here she keeps pig squeals, bear growls, bee buzzes, fly hums, rooster crows, hen cackles and so on. She invents these sound effects and her two men assistants manufacture them. But the hows and whys of her discoveries must remain a secret. Not even the broadcasting company knows what's inside of some of Mrs. Nichols' strange-looking contraptions. Yes, she patents them.

Mrs. Nichols' laboratory is really a fascinating place. Was that thunder? No, merely an assistant pounding on

stretched steer hide with cloth-muffled drumsticks. I asked her to turn the crank of a baffling cylinder. And lo! there was the sound of pouring rain. Peas in the cylinder rolling against the parchment container, made the sound. She cranked a mysterious box, and immediately there began the howling and shrieking of wind. No, I couldn't find out how it worked.

I pointed to another gadget. It was an air-proof container—a little bellows—with a tiny whistle attached. Laughingly Mrs. Nichols demonstrated. It was a cricket chirp. Rain on the roof? Promptly pebbles were pattering most realistically on calf-skin. A steady rain? She crinkled tissue paper. You've heard animals crashing through the forest? That's Mrs. Nichols holding a whisk broom close to the mike, running her finger across the straws.

"How do you imitate monkeys' chatter?" I wanted to know, thinking I now had something difficult. But she simply rubbed a wet cork up and down the side of a bottle—and the monkeys chattered vociferously. She also does this for certain bird sounds. Mrs. Nichols thinks that birds, dogs, mice and roosters, however, are best done vocally.

"Perhaps the largest thing I ever managed was the dramatization of the Porto Rican hurricane," she declared. "Seven men assisted me. We had the sound of the wind and rain and wild torrents, the climax of which was the wrecking of a train when the side of a mountain zoomed down on it."

Among the people who imitate animals and birds vocally, Tom Corwin, Purves Pullen and Harry Swan are outstanding. Mr. Corwin, who has spent a lifetime in the study of animal sounds, does most of the Chicago NBC animal sound effects. Mr. Pullen holds forth at KDKA. Mr. Swan is the studio menagerie at WABC.

When Purves Pullen was a small boy he could mimic animal and bird sounds like a veteran. And today, with his repertoire of over one hundred bird imitations, and seventy-five animal imitations, he finds himself in great demand at the Westinghouse Electric Company's KDKA.

"Some of the most effective calls I reproduce," says Mr. Pullen, "are those of the robin, bobwhite, whippoorwill, phoebe, red-winged blackbird, parrot and canary.

"I imitate the canary with the vibrations of my lips. This gives the trill. A projected front tooth in my lower jaw makes the chirp and clear bird-like whistles. In producing the off and on whistles, I press my tongue gently against my teeth and throat."

FROM THIS COMES A VARIETY OF SOUNDS

This is WGY's sound cabinet which contains within its polished exterior lion roars, dog barks and surf swishings and many other odd and necessary noises that contribute to making your radio programs sound real. Warren Munson is about to make a steamboat whistle

Everyone has heard versatile Harry Swan. "I've been everything from an elephant to a mouse," he declares. If you'll listen to Don Lang's "True Animal Stories", you'll hear him. He is the lion and the parrot and the dog, you know, and a very realistic zoo he is.

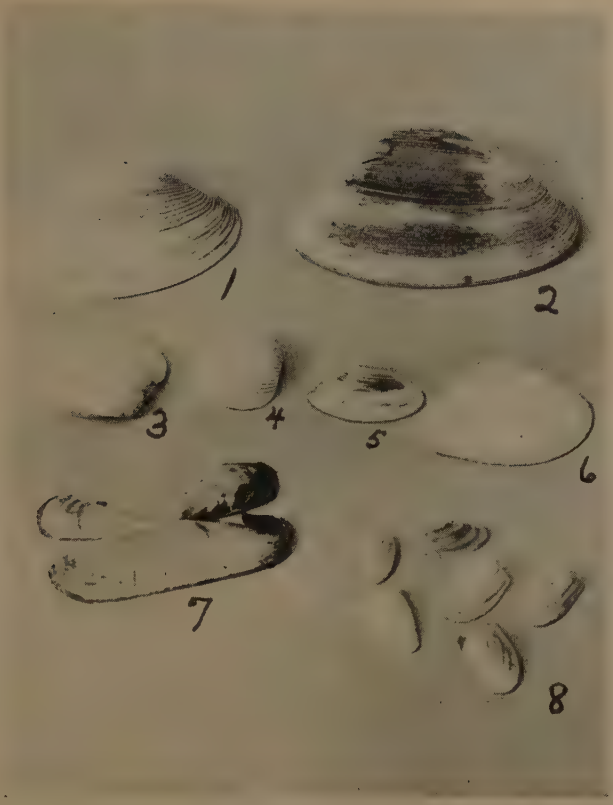
Mr. Swan's voice is really unique. He sings from bass to soprano, maintaining that he doesn't know where his voice will go next. He insists that animals talk, that they have a language all their own which he has spent years in learning. When he barks like a dog, he tries to do it as he thinks the dog would under certain circumstances.

"You're familiar with that peculiar noise the rooster makes when something comes near the barnyard which disturbs his peace of mind?" he asked, and thereupon produced the very sounds. Then he cackled like a hen. He used a megaphone in producing a deep dog bark.

"Did you hear us broadcast 'The Cricket on the Hearth'?" he asked. "I played the rôle of the cricket, and I cricketed and cricketed."

Mr. Swan has long since become immune to surprises in his studio directions. Being practically anything on the air is all in his day's work. Directions for his vocal imitations are interspersed throughout the script in this form: "Harry, you're a horse here. Next, you're a cow."

But one day Mr. Swan was actually bowled over. He was reading his directions. Suddenly he blinked, gulped and then roared with mirth. Staring up at him out of the script were the words: "Harry lays an egg."



A GROUP OF DIFFERENT KINDS OF CLAM SHELLS

1. Sea cockle. 2. Pismo clam. 3. Cockle shell of the genus Chione. 4. Another cockle. 5. A small Pismo clam. 6. A white sand clam. 7. A jack-knife clam. 8. A group of shells of the bean clams or wedge shells

In this interesting article Miss Shults tells of sea life that arrests the attention of all who love the beaches and is of special interest to the visitors to the many lovely beaches of California. It should aid in making the next visit to the sea-shore an even more worthwhile experience

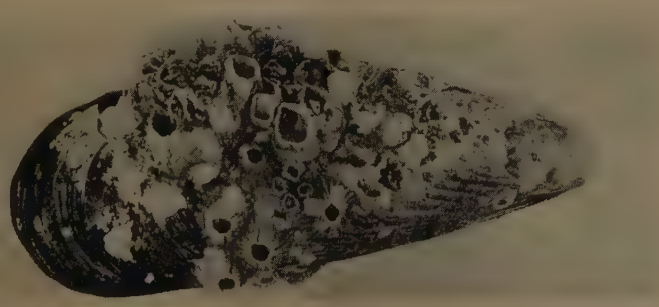
HARVESTS OF THE BEACH

BY GRACE A. SHULTS

LITTLE Indian knew why there had been plenty of rain that year on the Arizona desert, while the several preceding years had been dry, with sparse vegetation, lean hungry sheep, and almost no pasture. It was because he had pounded the sea shells to a fine dust and scattered the powder to the messenger wind which carried it over the country, inducing the rain god to hearken to the spirit of the sea released from those bits of substance that represented the great ocean.

The shells had been brought to him by Mr. Bailey, operator of the trading post at Cedar Springs, Arizona, when he returned from his vacation at a California beach. Rather than save the shells to be worn as a charm around his neck, Little Indian had performed this almost sacrificial rite. Then when the rainy season brought an abundance of moisture to break the long dry spell, he knew for certain that it was the gift which the beloved White Brother had carried to him from the edge of the great water that had brought with it the message of the sea and an end to their years of suffering.

Whatever caused the rain that year is, however, beside the question. The point is, that to the Indians a few shells represented the whole expanse of ocean and all the water which could be drawn up from it. And their idea wasn't all foolishness at that. Teeming with life, and alive with wonders, the ocean casts upon its shores only a few scattering samples of the abundance it holds in its depths; and those few samples thrill the heart of the Nature lover, till he, allured by their fascination, longs to follow those who explore the beauty-land inside the sea and walk among the submarine wonders of Nature.



A MUSSEL SHELL WITH ACORN BARNACLES

Both the mussel and the barnacles were alive when the photograph was taken. This specimen was found clinging with many others to a wharf piling during low tide at Newport Beach, California

For most of us land-lubbers who must do our collecting along the frilly edge of the great water, it is somewhat satisfying to be able to recognize the offspring of the sea which we find along the shore. We like to see something and be able to say, "Oh, yes, that is so and so," in-

A GROUP OF NON-MOLLUSKS

1. The dry tests of sea urchins. 2. A living specimen of the purple sea urchin. 3. Dry tests of the sand dollar or cake urchin. 4. A starfish. 5. Acorn barnacles from a wharf piling. 6. Goose barnacles from the same piling

stead of vaguely wondering whether the specimen at hand is plant or animal, seaweed or coral, sponge or sea shell, bryozoan or dry salt, clam or limpet.

Collections of sea shells brought home from the beaches usually include skeletal remains of representatives of five or six or more phyla of the animal kingdom, sponges, corals, sand dollars, barnacles, true mollusks, and other forms. It is incorrect to refer to the whole group as "sea shells," regardless of whether they are formed by mollusks or lowly coelenterates.

So let us take a look at the general types of shells found along sea shores, with a few glances at certain non-mollusks whose skeletons are found along with the true shells.

Shells do not just happen, nor are they found ready-made in the inorganic world, although mollusk skeletons have the same chemical composition as marble and limestone, combined with a small percentage of calcium phosphate. Limy secretions from the tissues of the soft-bodied animals build up layer by layer the shells to which the animals remain attached and in which they live. The analogy has been drawn comparing a shell to a little house inhabited by the clam, oyster, or other mollusk, but it is in reality more like a suit of armor. When a mollusk eats, the mouth protrudes from the armor, or if he wants to take a walk, he puts out a foot.

The tests left by sea urchins and sand dollars and the skeletal remains of other sea animals have a composition different from those of mollusks, but they are formed also by secretions from the body tissues of the animals.

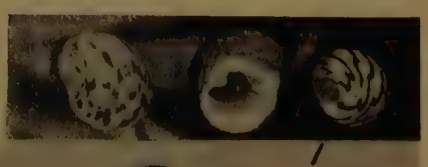
A barnacle is *not* a mollusk. It belongs to the class of animals called Crustacea, which also includes crabs, lobsters, shrimps and crayfish. The skeleton a barnacle leaves is not made up of limestone but of a substance called chitin (pronounced kī'tin). This is a tough, horny material, the same as in the external armor of crabs and lobsters.

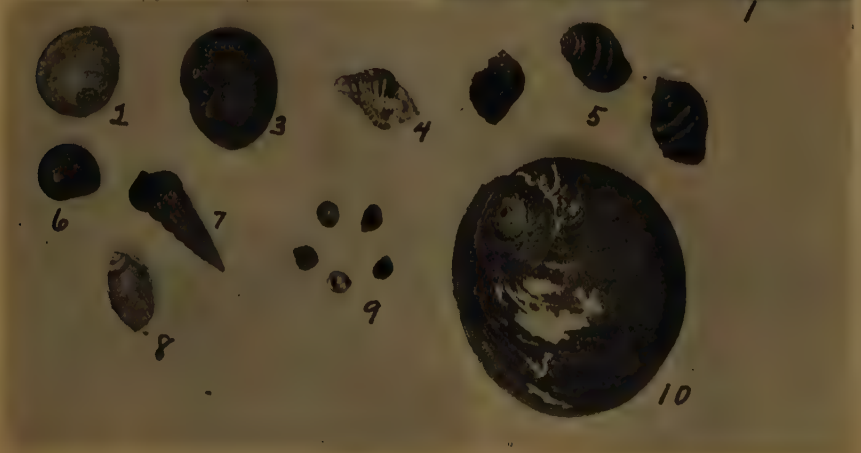
Two kinds of barnacles, goose and acorn, look so little alike with respect to their skeletons as to be hardly recognized as brothers, but the little creatures inside are almost identical. Wharf pilings and ship bottoms are so universally adopted for attachment by barnacles that one wonders what they did for places to stay before the days of wharves and boats, because adult barnacles do not swim freely in the ocean but must anchor for life on some object. Frequently, of course, they are found attached to shells of other animals.

When a barnacle first starts out in life it is a free swimming larva

SOME SPIRALLY-COILED UNIVALVES

1. Bleeding tooth shells. 2. A top shell. 3. A sea snail. 4. The incised Murex. 5. Rock snails. 6. Another top shell. 7. The California horn shell. 8. The purple olive shell. 9. Some one-banded chink shells. 10. The Lewis moon snail from Catalina I.





called a nauplius, having one eye, three pairs of legs, and bearing a single tiny shell. Later it develops two shells. Still later it settles down, fastens itself by its feelers, cements its head to the object of attachment, builds itself a new shell, and grows the cirripeds, or curly, feathery legs. Molested, a barnacle withdraws into its shell and shuts the lid, but if left undisturbed, the curling, claw-like feet will be seen to reach out surreptitiously, wave to and fro, and hurry back in.

The acorn barnacle builds a shell fastened directly to the supporting object. There is an outer shell and at the top an inner lid in four parts which the creature can open and shut at will. The shape of the shell varies slightly in different species, and a color range from white, through pink to brown and almost black is found.

The goose barnacle develops a muscular stem called a peduncle by which it is attached instead of fastening the shell directly to its support as does the acorn barnacle, while the chitinous plates at the other end enclose the body of the creature. The same brown, curling feet resembling antennae can be seen to dart out from the protecting encasement in search of any passing food.

A GROUP OF FLAT SPIRE AND CONE SHELLS

1. Abalone shells of various sizes. 2. The nut-brown cowry. 3. Ventral and dorsal views of the large coffee bean shells. 4. Living specimen of the worm mollusk in its wormlike shell. 5. The chiton with its shell made up of eight plates. 6. Ventral and dorsal views of several forms of limpets

The Echinodermata, or spiny-skinned animals, making up the phylum to which starfishes, sea urchins, and sand dollars belong, is a group of much lower development than either the Crustacea or Mollusca.

A meshwork of interlaced calcium carbonate plates forms the starfish's skeleton, which has about the same degree of flexibility as the chain mail armor coats worn by soldiers in times that we now call ancient. The arms have enough rigidity to support the animal as it stands up or walks on the tips of its arms, and the skeleton is sufficiently flexible for walking or swimming.

Those who have examined living or dried starfish specimens have noticed the small tube-like projections in rows down the center of each arm on the ventral side. These are called tube-feet and are used in swimming. Often when one attempts to force a starfish away from the rock to which it is clinging, the white, thread-like tube-feet will be seen to stretch out as elastic bands before they loosen their grip from the rocky support.

The dried skeleton, although slightly shrunken, preserves most of the original shape and appearance of the living animal. The most common starfishes have five arms, although there are species with eight arms, some with thirteen, some with twenty, and some with thirty and forty. The size and color also vary, and great diversity is shown in form. There are broad rays, long slender rays, forms that show almost no rays at all, and, at the other extreme, the lacy looking "basket-fish" with many branched rays ending in tendril-like, curling tips. The largest species of starfishes gain a size of four feet. The sea urchins, class Echinoidea of the Echinodermata, are also commonly called sea porcupines and sea burrs, which describes their appearance exactly. They might even be called sea chestnuts. These spine-covered balls may be found in any rocky pool washed by the ocean waves, or the dry shells, more properly called tests, may be picked up, devoid of spines, along any beach. The tests vary in color from white, through straw color to brown, but are of the same general shape, a slightly flattened ball with double rows of small knobs covering the surface.

When alive, the common purple sea urchin is covered with purple spines. Vermillion, green, white, straw color, jet-black, carmine and white in bands, are the various colors found in different species of sea urchins. The green sea urchin has the distinction of bearing the longest name

in zoological nomenclature, *Strongylocentrotus drobachiensis,* Muller. It is a rather common form despite the impressive title. Gradation of spines ranges from fine silky hairs at one extreme to the broad flat projections like little sails at the other end; from very sharp needles to blunt clubs, from soft to brittle; and includes solid spines, hollow spines, short spines, long spines, fluted spines and serrated spines. Their variety of form is almost endless.

While speaking of spines it is interesting to note that the long spines of certain large species of sea urchins have been used as slate pencils by missionaries in the Pacific Islands.

Is there anyone who has ever walked along a beach and not picked up a sand dollar? These flat, gray tests with a hole in the center of the ventral surface and the imprint of a star on the dorsal side, are really depressed sea urchins having spines reduced to a velvety down. Sand dollar is the common name known the world over, but they are also sometimes called cake urchins and sand cakes, while the scientist refers to them as order Clypeastroida of the class Echinoidea, of the phylum Echinodermata. The living sand dollar is purple, but the dry test is greenish gray. For the purpose of identifying sea shells it would be well to know the five, easily-recognized classes into which Mollusca can be grouped, and which are easily remembered. These are:

A HALF-DOZEN OF THE STAR FISHES
1. Ordinary five-rayed star fish with stout, tapering arms. 2. A serpent star with distinct disk and spider leg arms. 3. The twenty-rayed sunflower star fish. 4. An almost perfect pentagon with no distinct rays. 5. A sand star with regular star shape. 6. A red star fish with large one-inch spines

Bivalve Shells—Forms having two shells, such as oysters and clams. This group is called Pelecypoda.

Cylindrical Shells—Long tapering tubes, the tooth shells. This group is called Scaphopoda.

Spiral and Conical Shells—Such as snails and limpets. Gastropoda.

Shell Made up of Eight Plates—Such as the chitons. Amphineura.

Cephalopoda—A head with long arms, such as the octopus and squid.

There are some mollusks with internal shells which would hardly be recognized as shelled animals by the unknowing. The internal shell is not so strange, however, in view of the fact that we humans also are built with our skeletons inside. Still other mollusks have thrown off their corsets entirely and go bravely forth with their soft bodies unprotected. The garden slug can be readily identified as a first cousin to the snail, and many sea slugs might be recognized by a similar body structure.

The bivalves include clams, oysters, mussels, scallops, bean shells, and razor blades.

Mussels have brown and black shells that are bluish underneath or exposing a lustrous, pearl-like surface if all the outer crust is scraped off. A mass of dark threads of varying lengths attaches the shell to rock, wharf piling, or whatever other object is available. Mussels are extensively used for food.

Among the most beautiful shells found are the scallops. They are deeply fluted with longitudinal grooves and are prettily colored and marked. Two wing-like projections called ears characterize them and help in their identification.

The clam family is a large one, numbering among its members the little bean clams—or wedge shells—, the jack-knife clams, the razor clams, the boring clams, the big five-inch Pismo clams so largely used for food, the purple clam, the sunset clams, the white sand clams, and the huge Tridacnid clam, measuring five feet across and weighing as much as five hundred pounds. These giant clams are found in the Indian Ocean and in the southern Pacific Ocean.

Resembling hollow tusks with the ends snipped off, the cylindrical shells of the class Scaphopoda can be easily recognized by even the unpracticed eye. They are called tooth shells because of their likeness to tusk teeth.

The class Gastropoda takes in snails, sea slugs, limpets, abalones, wheat shells, cowries and various spirally coiled or conical shells.

Although sea slugs belong to the same group as those forms bearing spirally coiled shells they have no shells. Nevertheless, it is impossible to pass them by without at least a brief mention, because they are so strikingly beautiful and so unusual in design. Bearing a resemblance to the common garden slug in shape and design, with two pairs of tentacles and a body elongated into a foot for locomotion, the sea slug seems ethereal and beautifully dressed compared with its homely, despised cousin.

The most beautiful of the sea (Continued on page 40)

THESPIAN OF THE GARDEN

BY
BEN HUR LAMPMAN

ILLUSTRATED BY R. BRUCE HORSFALL

SINCE everything that is, has been, and our amazement at this or at that is but an echo of the marvelling of men long under green turf, one need not be in the least surprised to find that what he sees in his garden on a summer day was seen, as like as not, by Samson in the far, forgotten vineyards of Timnath; by none other than the hero of Israel, that time he went to the wooing of the lass of Philistia. And if the fundamentalists find fault with the parallel, let them know that it is given in all kindness, and with no thought save one of wonder that then and now could be so much akin.

To begin with, there stood in a garden corner—a very commonplace garden quite unlike the purple Timnath vineyards—a rusty old washboiler which held a fluid fertilizer, a witch's brew of compost and stale water. From this the gardener dipped when he felt that any flower had need of special fare to give strength to its stalk and brightness to its blooms. And, so dipping, to his great wonderment he brought to view, on a June morning, sundry pale creatures that seemed less of this planet than another. Plainly they were larvae, writhing sluggishly hither and yon, but quite as plainly they were the queerest larvae that ever the commonplace garden had known.

One mustered his courage to look upon them—and this, I take it, is true of most of us when we confront the ugly fact that precedes and publishes beauty. Beauty in a battered washboiler, forsooth! Therein was no beauty, and even the boiler itself had been properly and discreetly hidden from the fastidious glance. Beauty, indeed!

And the larvae were the gray pearl of a dull morning, with flaccid bodies that spanned an inch and they moved with the blind and weary patience of their kind. Yet if this were enough to note of them, it was not all—for each and every larva of the lot bore a long tapering tail, unpleasantly suggestive of the rat. Revulsion? Yes, but fascination, too. They held a secret in those sodden tissues. They were not doomed to squalor all their days, not they. On a morning late in summer they should rise reborn, on wings of gauze, to seek the taverns of the flowers.

And had you visited that garden some weeks later, you would have seen—as the gardener did—the brown and golden bees that hurled themselves happily upon a varicolored row of immortelles, swaying beside the wall. The boldness of the rovers set the tall flowers to tossing like masts at sea—like masts with gold and white and crimson crow's nests. But were they bees to the last busy ruffian of the crew? For some, you must have gasped to see—though not without mistrust—were no true bees but merry masqueraders. They wore the livery and they played the part. Yet they lacked the swagger of the garden rover. And they were weightier than the honey bees about them, and of a brighter coat—and if one put his valor to the test, and snared the shining cheat in a bare and apprehensive hand, it was to know the thrill of guessing right. For their nether parts had pulsed so suggestively, and with such conviction, that it had seemed a fiery sting might indeed be sheathed there. But for all his furious buzzing in the closed palm this liveried comrade of the bees was naught but a handsome, harmless fly.

The drone-fly he is called, and an apt name it is, as sound as any common christening you ever heard of. And he was once the rat-tailed larva found in fluid trash, and in that season of poverty he employed his preposterous tail for the most sensible of purposes. He thrust it periscope-wise above the stagnant surface and drew down to himself the air that he must have or perish. What a triumph was his, what a rise in the world, indeed—from lowly putrescence to tall and comely flowers! For he became a free-companion with the bees, and as such was tolerated by those Captain Bloods of the garden—mayhap by virtue of the livery he wore. And they say, too, the men who know his ways, that he toils in her deep caves for the humble-bee, and does general housecleaning by the day. A thrifty and a useful fellow, who does not hold that labor bemeans him, as do many of

those scatterwits, the flies. Nature is full of surprises.

You may well believe that when the children knew him for the fraud he was, they turned that knowledge to rich account in the confusion of their playmates. Very gravely they would tell that certain bees were tame and knew the voice of friendly authority. And when the skeptics vowed that this could never be, and that it never had been, and scoffingly said they'd like very much to see a practical illustration of the matter—why, then, Hope would tip-toe to the immortelles and feign to cozen the fat fellows that fed there.

"Will-yum! Will-yum! Have you forgotten me? There's a good bee, there!"

And her slim hand would dart to a flower of gold and catch the golden mime upon it, and hold him captive for all his humming remonstrance. And tumult would enter the garden, and shrill, sweet laughter, and the brown curls of Frances would toss and twine as she fled. Fancy anyone being so familiar with a bee!

Though we have just discovered him in a commonplace garden, where he awaited us these many summers, the drone-fly is as ancient in the lore of human-kind, as the cuneiform writings on the bricks of Babylon. Men knew him of old, and the jest of it is that they thought the gentle mimic a veritable honey-bee, and feared him for his feigned fury and the pulsing of his abdomen, and told one another that bees were bred oftentimes in the decaying bodies of beasts. If you will open your Bible and search the 14th chapter of Judges you will perceive that it must have been the drone-fly, and none other, that time in the vineyards of Timnath.

There it is written down that a young lion roared against Samson, with more conceit than prudence. It was perhaps the worst possible moment of all for even a young and foolish lion to venture such an indiscretion. The invincible hero of the tribes had in his heart a hot love for the lass of Philistia, and he set his palms to his hips and squared his great torso and gave that lion stare for stare. And then—because the lion crouched between him and his desire—he rent it jaw from jaw and cast the tawny, torn flesh aside, and went his way. He talked with the fair Philistine, in the pleasant purple vineyards of Timnath, and was pleased with her. More, he was pleased with himself. For when he came again to claim the woman he paused to contemplate the carrion of the lion that had dared roar at Samson. And of this it is written:

"And after a time he returned to take her, and he turned aside to see the carcase of the lion; and, behold, there was a swarm of bees and honey in the carcase of the lion."

Well, it transpired that she wasn't the wife he expected her to be, and this, in some small measure, should have warned him against his subsequent misadventure with the bewitching Delilah. But the "bees" that rose and circled above the carcass of the lion, on the road to Timnath, what could they have been but drone-flies newly freed from their foul prison? For in Nature, a thousand years and now are not so dimly sundered, nor Palestine and here so far apart. And flies and men change slowly.

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BILLBOARD SLOGAN CONTEST

THERE are undoubtedly many people who can say what they think about the rural billboard ruining roadside scenery and endangering safety of highway travel. But most of us need a lot of words to express such thoughts.

The question now is —Can you say what you think of the billboards in five words or less and thus create an effective slogan arousing others to a realization of the nuisance of this parasitic growth?

To obtain such a slogan, the American Nature Association and the National Council for Protection of Roadside Beauty join to offer prizes of $25 and $10 for two slogans of five words (less would be better) suitable for use on automobile tags or stickers.

ARE YOU READY TO DIE?
KEEP YOUR EYE ON THE SIGN BOARDS
SAFETY FIRST SIGN CO. INC.
ROSES ARE RED, VIOLETS ARE BLUE, DRIVE SAFELY, THIS MEANS YOU!
READ THIS SIGN AND PLAY SAFE!
GOT A DATE WITH THE UNDERTAKER?
THEN WHAT'S YOUR HURRY?
SAFETY FIRST SIGN CO. WATCH THIS SPACE!!
Herbert Johnson

The two entries will be chosen by a board of judges made up of Herbert Johnson, the noted cartoonist; Struthers Burt, the author; Arthur Newton Pack, president of the American Nature Association.

The slogans may be submitted to The Roadside Bulletin, American Nature Association, 1214 16th Street, Washington, D. C. The contest closes July 15.

A BARRED OWL GUEST

BY ROBERT CUSHMAN MURPHY

AMERICAN MUSEUM OF NATURAL HISTORY

FREEDOM IS DECLINED WITH MANY THANKS

Although it was offered him without restraint, Voltaire showed no inclination to leave the hospitality of his human hosts. In fact, he seemed to revel in his new-found associations and to conclude that humans were not so bad, after all—a trust which we hope has not since been violated by other humans with a different attitude towards owls

FOR AN adult wild creature to fall into human hands must be a strange and bewildering experience. Perhaps that is why the reactions of unharmed captive birds are sometimes so unexpected. The tendency of song birds, taken in a banding trap, to lie for many seconds flat on their backs upon an open palm, before they take advantage of their release, is well-known to all who coöperate in a modern and illuminating phase of ornithological study. The behavior of some of the larger species, such as birds of prey, can be at times even more startling.

One January evening a colored man brought to a plantation house beside the River Pee Dee, South Carolina, a barred owl that had unluckily alighted in a trap set for minks upon a log in a stream. One leg was slightly cut, but neither bones nor tendons were injured and the owl retained the full use of the member. When taken

LOOKING UP FROM THE SERIOUS BUSINESS OF A MEAL

Voltaire, the barred owl, turns from the gustatory task in hand and gives an excellent demonstration of the bars on the feathers for which he is named

out of the burlap sack in which it had been carried, the bird stood up on the brick floor of a high-vaulted room filled with people, shook its plumage, calmly surveyed its strange companions, and clicked its bill with a loud resonant snap when it was stroked upon the head or back. It showed no resentment against being picked up and balanced upon the arm of a chair. When a dismally cold chicken wing was fetched from the ice-box, it accepted bits of raw meat as quietly and undemonstrably as a child taking medicine which is neither sweet nor unpleasant. Because of the day's reading by one of the guests, together with the barred owl's alleged mocking

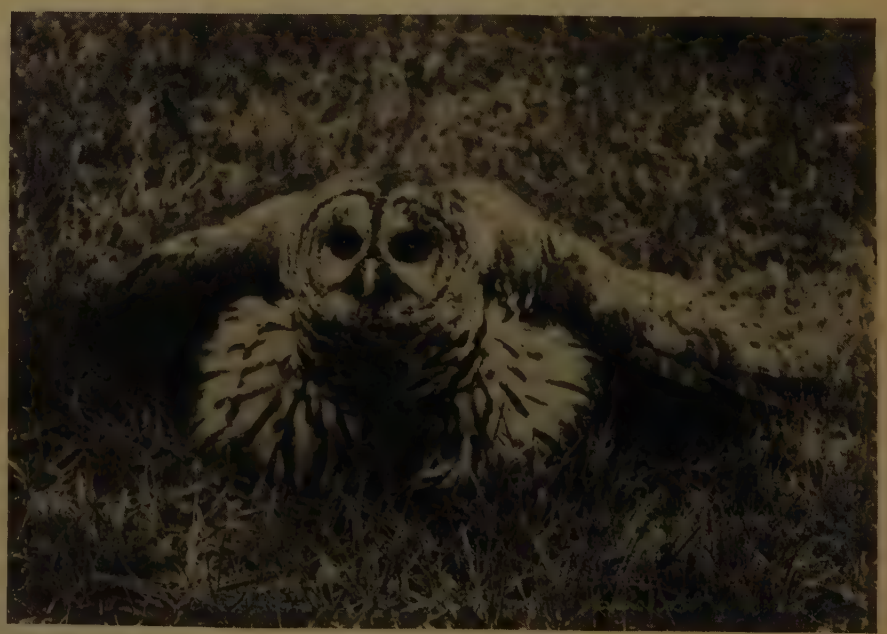
A CONVENIENT PERCHING PLACE

Every reaction was apparently functioning, yet he was content for the time to be a pampered pet and to roost contentedly on his stick

expression and inscrutable behavior, it was christened "Voltaire." There were surely no other grounds for the name, the recipient being as rotund and fluffy as a ripe cotton-boll.

After inspection and feeding, freedom was the next thought on behalf of the owl, which had been fortunate in its choice of captors. So it was carried into the dark of a quiet winter evening, and left to its own devices on the limb of a cedar tree. At bedtime the unhopeful formality was suggested of making sure that the bird had flown. An electric torch was turned toward the branch, illumining the enormous dark brown eyes of Voltaire, who sat as though still trying to collect his (or her) wits. This suggested a more serious derangement than had been suspected, so we bore him unresistingly into the gun-room and ensconced him upon the back of a tall chair for a night of complete safety. The only recorded incident occurred in the dim light of early morning. Ben, the houseboy, all unknowingly entered to dust. A sharp snap in his very ear whirled him face to face with a horrible apparition, of the existence of which he had been previously cognizant only through the widespread Low Country stories of "plat-eyes" or other spectres. That, at least, was his first and strongest feeling.

On the second day as a guest—there would be no justification for the term "captive"—Voltaire continued chummy relations with his hosts and showed improved appetite. Perhaps two warm and bloody starlings, in place of icy chicken, were the true reason for greater gusto in eating. He flew once across the gun-room toward a closed window, but when placed on the lawn he merely hopped and flopped about, and was strangely indifferent when picked up again and passed from hand to hand. Of his bill there was no cause to be timid, but care was necessary to make sure that he might not sink his long gripping talons, without malice aforethought, into one's arm. A cane made a cheerful perch, and along this Voltaire would gradually edge up toward his holder, answering *cluck* with *clack,* until it seemed advisable gingerly to turn the stick end for end, sending him again to the foot of the class. To rotate his



PROGRESSION ON THE GROUND IS MORE OR LESS QUADRUPEDAL

Placed on the lawn he merely hopped and flopped about, and he was strangely indifferent when picked up again and passed from hand to hand

body was simple enough, but his head usually remained as fixed as a compass-needle in an intent eye-to-eye stare, even if he had to twist the neck through more than half a circuit to hold it.

Not even an unwelcome guest was ever given more pointed hints to say good-bye, but Voltaire declined to be hurried. Late in the afternoon of the second day, just after finishing a meal on the ground, he turned his swivel neck so as to look backward into the wide branches of a live-oak, and then leaped casually into the air and mounted with soundless beats to a perch some thirty-five feet above us. Framed in streamers of Spanish moss, he peered down with the same imperturbable manner. Within a twinkling the blue jays arrived from nowhere—one, two, five, ten—screaming at him, mobbing him, from above and below and from all sides. At least two actually struck him with their beaks, but if the owl so much as realized their presence it was beneath his dignity to show it. With a last glance downward, he once more took flight. High over the great live-oaks, along the banks of the brown Pee Dee, he stroked a straight and steady course, with a comet-tail of jays in his wake. Perhaps he has long since had his full revenge.

EDGING UP AND BECOMING CONVERSATIONAL
It was wise for the holder of the stick to watch lest the owl's talons, without malice aforethought, dug into his hand

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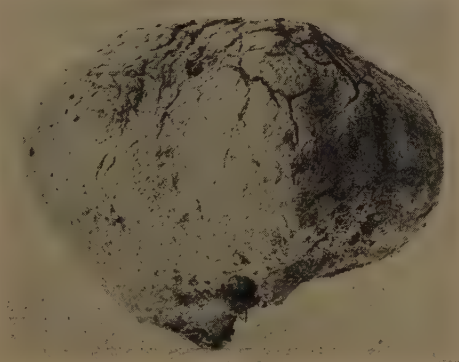
HARD-SKINNED PUFFBALLS V

Another article in the group on the hard-skinned puffballs

BY DR. WM. A. MURRILL



On banks and roadsides and in the short grass that grows in thin woods dwells in abundance a large, dull-colored species, one of the hard-skinned puffballs. It is known as the large hard-skinned puffball, or *Scleroderma geaster,* and resembles a potato that has been exposed to the light and become somewhat greenish. Usually it is half-embedded in the earth and is inconspicuous until maturity, except where it grows in clusters.

The biggest of the hard-skinned puffballs, it is 7 to 10 centimeters in diameter. The skin is thick, rather rough and yellowish or greenish brown. It characteristically splits at maturity in a star-shaped flare at the apex, reminding one of an earth-star, although the earth-star splits in this way more completely and regularly and has in addition an inner membrane enclosing a spore-mass. The interior of the large puffball is umber or blackish with a purple tint; the spores are rounded and coarsely warted.

The very young specimens are edible and quite tasty if well cooked. They should be peeled, and the base thrown away.

Sometimes the large hard-skinned puffball becomes abundant enough to injure lawns. A favorite place for it is a clay bank, where the old fruit bodies flatten out like star-shaped pieces of black leather and color the soil below them with spores spread by the rain.

THE WILD LIFE RECORD OF ANCIENT POTTERY

BY BRUCE BRYAN

ILLUSTRATIONS COURTESY ART AND ARCHAEOLOGY

IN ATTEMPTING to reconstruct the story of past ages, archaeologists are inevitably confronted by the fact that Nature is constantly changing. Not only do the surface characteristics of a strip of country undergo a physical metamorphosis, but also the wild life inhabiting it. Vegetation changes according to climate and the supply of water, and many areas once capable of supporting life become sterile deserts. Such is the case with many of the ancient Pueblo ruins to be found today in the Southwest. While to the casual observer it might seem impossible that human beings could exist in such waterless wastes, it is often apparent to a geologist that perhaps no more than a few centuries ago a river flowed through the same territory.

Wild life may have disappeared completely, except for the reptilian denizens of the desert, and the arid aspect of the country may lead one to believe that larger animals never dwelt within its confines. But a study of the material remains of the prehistoric peoples who lived in these regions has often proved the contrary. Wherever there was water sufficient for his meager needs, the early Pueblo Indian not only built his curious stone-and-adobe terraced houses, but also managed to cultivate a respectable plot of corn, beans, squash, and sometimes cotton. In fact, many of the fruits and vegetables we have today are derived from the primitive products of the sedentary tribes of ancient America. It is owing to their ability as "dry-farmers" that the olden Puebloans were able to settle down in permanent villages and build up their remarkable civilization. Before they discovered how to grow maize, the aboriginal inhabitants of the Southwest were forced to live a nomadic life, dependent entirely on the game trails and the seasonal migrations of the animals they hunted for food.

In most of the old Pueblo cultural areas there is but little wild life of any size today. This is due not only to the gradual change of climate and surface environment, but, also, to unrestrained slaughter by white men. Scientists have found that large game was fairly abundant in the days when the native settlements flourished several centuries ago. A wide variety of tools and weapons found in the forgotten ruins of the Southwest attest eloquently to the multitude of animals from whose bones they were skillfully fashioned. Scrapers, fleshers, darts, drills, awls, whistles, flutes, beads and pendants were all made from the bones of game animals slain in the chase. When an animal was killed by an Indian, little, if any, of the carcass was wasted. After every edible bit of meat was consumed, the hide was tanned for clothing, sandals, waterbags and thongs. The intestines were used for bowstrings and thread, and the bones converted into implements.

INDIAN POTTERY WHICH GIVES A CLUE TO THE WILD LIFE OF A PAST AGE

That there were dogs seems indicated by the effigy handle on the specimen of corrugated bead-bowl at the left, while the dishes at the right show the Pueblo conception of animals of another day in the Mimbres Valley

The surest key to the natural history of a particular cultural division of the ancient Pueblo tribes is to be found in the truly remarkable pottery of the Mimbres Valley in southern New Mexico. The people who formerly dwelt here had utterly vanished before the first white men entered the country, and their stone-walled villages were all in ruins. Mimbres naturalistic black-on-white pottery, the finest development of Pueblo ceramics, is a veritable catalogue of the fauna of the valley in pre-Columbian times. Painted on the inside of food bowls were the representations of the forms of human or animal life as known to the Indians of that period. In many cases hybrid conceptions of highly imaginative composite monstrosities were depicted. Insects, fishes, reptiles, and mammals were all portrayed. Among the first are examples of caterpillars, waterbugs, dragonflies, grass- (Continued on page 40)

STARTLED BY THE ODD NOISE OF THE CAMERA MANIPULATION
The strange buzzing sound attracted the attention of the big bull moose toward the spot to which the photographer had so laboriously crawled

MOOSE MINDED

SOME HIGHLIGHTS OF SHOOTING THE ANTLERED MONARCH WITH A CAMERA

BY ELEANOR B. PACK

PHOTOGRAPHS BY ARTHUR NEWTON PACK AND THE AUTHOR

"I WONDER if the mountain peaks push the stars up into the sky. They seem so high above us here," mused Art as we sat around a crackling campfire one evening. He was looking up at the array of jagged mountain peaks which cut strange designs against a star-sprinkled sky. "Now, in Arizona the stars shine like beacons and the earth and sky seem to meet. But here the sky is far away."

We hunched a little closer to the fire as a cold wind began to drift down from the glaciers. Beside us the rushing torrent of Moose River, swollen by the melting snows of the warm day, lapped insistently against the bank. In the distance we could hear the faint tinkle of bells as our horses moved about and fed on the dark slopes above.

Charlie brought our attention back to practical matters by reminding us that plans for the morrow must be made.

"It doesn't matter to me, of course," he said. "If you want to take the risk, you can; but I'm not going to set foot in that rubber boat again—not by a long sight!"

Roars of laughter followed this remark. We remembered the bedraggled figure of Charlie as he stumbled back to camp with the deflated rubber boat on his back after his first venture down stream in this new, strange craft of ours. We had all gathered on the bank of the river to watch him gleefully climb into the boat, which had bobbed away down the stream

THE COW MOOSE APPROACHES
Curiosity and caution mingled as she made her way through the water toward the lens of the camera

A STRANGE AND RESILIENT CRAFT IS THE RUBBER BOAT

Mr. Pack thoughtfully regards the stream-going equipment of the camera hunting expedition before it is put in the water and sets sail down the river

like a spinning top and disappeared around the bend. A little farther on, deciding that the rapids ahead looked too violent, Charlie had grabbed at an overhanging branch as he passed. The sudden pull half upset the boat which floated out from beneath its passenger and left him dangling from the tree, with his legs in the icy water. Crestfallen, he had tried to sneak back to camp without being seen, knowing full well that he was in for a great deal of teasing.

"Well," said Walt, "the water won't be so high in the morning before the sun has got in its work with the glaciers, and I think it would be good sport. I'm sure we could sneak up on any moose in that lick. It's a great chance."

Just as we left the circle of light around the campfire and headed for our tents, a twig cracked behind them and a shadowy black form disappeared in the darkness. A grizzly!

"Hey! Where's a flashlight?" whispered Walt.

Art rushed to the tent and emerged a moment later, directing beams of light towards the trees, among which bruin had disappeared. Too late. But nearby some deep tracks as large as dinner plates testified to the immense size of the grizzly. All that night we slept lightly, conscious of every new sound, nervous when the sudden clatter of the horse bells told us that a horse was running; wondering how intimate that grizzly was going to prove. But we were also wishing that he would stay around until daylight would make it possible for us to photograph him. Such is the perverse disposition of these bears in Alberta that they retire during the daytime, and lucky is he who sees one.

"Roll out!" called Harry, the cook. Stumbling out of our tents into the early morning sunshine, we washed our faces in the icy waters of the rushing river. Then to breakfast in the cook tent. The day had begun. After getting together the camera equipment, we had the real job of blowing up the rubber boat. The sunlight rippled on the water and cast a dancing reflection as we launched the boat in a corner of a small back wash where the current would not impede the operation of loading it. Soon the cameras and lunches were stowed, and Art and reluctant Charlie were ready. I stood on the shore with the other movie camera, ready to make a record of the start of this new adventure. It was planned that Walt

A BROKEN TWIG AND THE BULL MOOSE LOOKED UP QUICKLY

The wind being in favor of the photographer, the quarry soon lost interest and went about its moosey business while the camera hunters crept even closer

and I should ride down to the lick later in the day, leading two horses, on which Art and Charlie could return to camp.

"All aboard!" shouted Art, and soon the bobbing boat was floating down stream as light as a feather. Art sat in the bow, if such it could be called, with the camera mounted on the tripod and ready for instant action, while Charlie handled the oars and kept the craft from spinning around. As the boat was swept into the current, it began to bob like a soap bubble and was soon whirled out of sight.

A few hours later Walt and I swung into our saddles. With the camera suspended from my saddle horn, ready for any emergency, we started down the rough trail towards the lick.

"We'd better leave the horses here," said Walt in a low tone of voice. Hoof beats might mean more moose to a moose, so we told ourselves, but voices mean nothing but humans. Tying the horses to the low-hanging boughs of the spruces, we picked our way carefully toward the muddy lick which we had seen from the trail on the previous day. The wind was in our favor. Cautiously creeping up, we peered through the evergreen branches. Ahead of us lay a large opening in which the muddy ground was trampled like a barnyard. Here and there a fat lazy porcupine wallowed. One, overcome by sleep, sat on a hummock of grass, his short arms folded over his rotund tummy and his head nodding like that of an elderly man over his evening paper. I began to chuckle, in spite of myself. Just then a movement caught my eye. It was Art, partially concealed behind some bushes. He was slowly rising to a kneeling position behind the camera which I could now make out through the intervening branches. Looking in the direction toward which the camera pointed, we saw a large, sleek, dark cow moose deliberately advancing into the lick. Swinging her ungainly head from side to side as she looked around her, she paused a moment. Then, grunting in a pig-like manner, she walked out into the open lick. Just behind her a calf came trotting out of the woods, ungainly as a new-born colt, but not much more so than his knock-kneed mother. The camera clicked. The moose stopped with a puzzled grunt. The clicking continued. The moose sniffed the air. No tell-tale breeze betrayed us. On she came, ears alert and small black eyes endeavoring to

discover the cause of the noise. Stopping again about forty feet from the camera, she listened attentively. Unfortunately, at this moment, as is the way of cameras, the time had come when Art's must be rewound. This change of noise was just a little too much for the suspicious animal, and, with another grunt which sent the calf back into the protection of the timber, she moved off and disappeared.

It was now noon, when most animals take a few hours off to snooze. So Walt and I joined the others and soon we all were back at the place where we had left the horses. We sat down to enjoy our sandwiches.

A COW MOOSE IN A TRULY SYLVAN SETTING

There is a suggestion of coyness about her as she peers from among the trees before she emerges into the open part of the lick

"Gee!" said Art. "We shot down the current so fast that we caught up to a fleet of baby harlequin ducks. That distracted mother didn't know what to make of us, but I got a great movie of them bobbing along in single file, like a string of toys. And a caribou was in the lick when we came up. She must have been the same cow that came into camp with the horses this morning and then stampeded off for parts unknown at sight of us."

The next day we rode several miles from camp to another large "lick", of which Charlie knew. Tying our horses to trees and suspending our camera cases on ropes to keep them out of temptation's way, should a porcupine discover them, we walked quietly through the timber for a quarter of a mile. Soon we came out on a wide grassy meadow, marked in brown where two small muddy licks interrupted the smooth green stretch. At the left of a small point of land we could glimpse the edge of a pond. Art headed for this point, to set up the camera in a group of spruces, while I headed around to the right to a place where I could hide under a huge tree with low-hanging branches, and where I could set up my camera in a position to command both muddy licks. Quietness. Not even the cry of a hawk or the call of a camp-robber jay. Soon the mosquitoes and flies closed in on me. I spread dope on my face, neck, and hands in gobs. This saved me from torture, but the incessant singing was nerve-racking. I dozed and watched in turns. More waiting. More silence. Clouds cast shifting shadows over the red and green slopes of the mountain towering at the end of the lick beyond the pond. About five o'clock I saw Art and Walt move from the blind to the left. A half an hour later a cow moose came out on the other side of the pond, a mile from me. Then a huge old bull slowly and majestically moved out of the woods after the cow and came to the edge of the water to feed. Knowing that the other blind was now unoccupied, I decided to try to get nearer to the moose. I hate to be left out of any possible excitement. Therefore, I packed up my things and carefully sneaked back into the woods to detour around behind the point, out of sight of the bull and cow. I crossed an open space and crept up to the deserted blind. Just then Walt crawled up, saying that Art was farther down the lake. We were still over half a mile from the moose.

"We'll have to try to cross the lick. It's our only chance for a picture," whispered Walt.

"Okeh," I answered, and Walt took my camera, mounted on its tripod. Single file, we crept out into the open to cross to the woods, where we might sneak up on the moose from the rear.

"Don't move except when both the bull and cow have their heads down, feeding," cautioned Walt.

"I know," I replied. "And I'll keep behind you, so

that we'll be only one dark spot instead of two."

We ran, bending close to the ground. The cow looked up. We froze in our tracks. Would she never go on feeding? Down dropped her head, and up came the bull's. We should never make it. It was at least an eighth of a mile across. Suddenly the bull lowered his head, and we rushed as fast as we could for about a hundred yards before the cow again looked up. She was a suspicious creature. She looked around and sniffed the wind in every direction. Finally, she started to lower her head, but, just as we began to move, she looked up again. "Darn that cow!" mumbled Walt. But she had not spotted us, for soon she continued to feed, and we crept on again, this time reaching the first scrub spruce before she raised her head. Still advancing cautiously, watching for open spaces in the timber, through which the moose might see our moving figures, we picked our way along, keeping well inside the woods, lest some chance breeze blow our scent towards the animals. Finally, we were within two hundred yards. "Here you are," said Walt, handing the camera to me. "Be careful! I'll wait here."

I crept nearer, with the tripod held tightly to avoid any chance clatter. Keeping a tree always between me and the game, I reached a small open space with a dead log lying across its entire width. I should have to climb over the log. Waiting again until both heads were down, I moved forward. A twig caught my trousers just as I was stepping over. Both moose looked up. I was in full sight. They must see me. I froze. With my weight upon one foot, the camera grew so heavy that I could scarcely hold it. Would this go on forever? The bull lost interest, but the cow continued suspicious, as well she might. Just as I began to give up hope, she, too, turned away to feed in deeper water. This time I made my goal behind the tree. But every few seconds the moose looked in my direction. They felt that something was wrong, even if their poor eyesight had not picked me out, and the wind, for once, had been on my side. When I was within one hundred feet, I crept out into the open, and the camera began to buzz. Both moose turned around. The cow immediately grew nervous. She edged away, but the bull stood in the muck at the edge of the water and stared intently in my direction. What antlers he did have—more than fifteen points on each side—but I had no time to count accurately. Instead of the usual bell, he had a large, heavy pouch. The cow started slowly across the lake. I grabbed the camera and ran toward her at full speed. Then I stopped in time to get a shot of her trotting away, the water flying in every direction. I turned back to face the bull. He was now nearer than one hundred feet, and couldn't make up his mind what to do. He looked at me, then at the cow. Finally, he began to move away slowly and ponderously, until the action seemed to clear his befuddled brain and he, too, plunged into the lake to trot after the cow across the shallow water.

PATIENCE IS THE ATTRIBUTE OF THE CAMERA HUNTER

Many hours are spent in the blind waiting for the prospective wild actor to arrive—and sometimes he never puts in appearance

"Swell!" called Walt, as he came up to join us.

Our waiting horses snorted as we emerged from the forest in the gathering twilight. A sunset of pink and gold painted the clouds and mountain tops. Dusk had fallen before we reached camp, but the cook had kept a hot supper waiting for us, and a roaring fire crackled in front of the shelter tent. Tired from well-spent effort and relaxed from the thrill of the chase, we dropped down to encompass a meal of record proportions.

TRAMPING THE WOODS

BY FAY WELCH

DIRECTOR, TANAGER LODGE CAMP; SPECIAL LECTURER IN CAMPING TECHNIQUE, NEW YORK STATE COLLEGE OF FORESTRY, AT SYRACUSE UNIVERSITY

Another article in the series on camping giving practical advice based on long experience under all sorts of circumstances. Here one can learn how to sleep comfortably, keep dry and cozy and enjoy the wild to the fullest. The Camping Editor is at your service to give you further advice and particular points or refer you to any sources of special equipment.

THANKFUL are all true adventurers that, with all our modern means of transportation, there still remain glorious, remote corners of the earth that are accessible only to those who are still strong of wind and limb. Where motors, canoes, or pack animals avail not, there are mountains and mesas, glaciers and glens, wild wooded passes and thundering waterfalls to tempt anyone who is willing to shoulder pack and fare forth. For such the following is written.

Sometimes there is a guide, but often if one is to get the best out of his wilderness adventuring he must guide his own party, or "go it alone." This presupposes several specific skills. Among them bulks large the ability to read maps, not alone road maps, but the United States Geological Survey sheets, with all their contours and other symbols. From such a map it is not only possible to figure the compass bearing of a line from the base camp to a distant peak, but one can also picture the intervening topography and decide whether it will be best to swing to the right or left to avoid an extensive swamp, or from what side to attack the mountain so as to avoid alike steep cliffs and high walled gorges. The explanations on the back of each Geological Survey sheet will greatly assist the amateur map reader. To use a map effectively one must be able to orient it, read a compass and locate one's own position on the map accurately.

Upon arriving in a new and strange part of the country it is always wise to study the topography of the region, noting carefully the location of bodies of water, drainage systems and prominent landmarks, and determining in advance what courses to follow to work one's way out of any particular section. This is particularly necessary for the hunter, because he seldom sticks to the trails of the hiker or the streams of the fisherman.

No one traverses the wilderness for long without being lost. Whether the experience proves an interesting adventure or a stark tragedy depends largely upon the individual. His greatest danger lies in himself. If he becomes panic stricken he soon changes from a "lost" man to an insane one. Therefore probably the best procedure if you should discover that you were lost would be to sit down and have a smoke; or if you do not smoke at least find a comfortable seat and calmly review the situation.

Perhaps you can figure out quite clearly how to work your way out. It is possible, however, that in trying to do this you will only exhaust yourself, waste time that might better be spent in gathering wood and otherwise preparing for the night, and wander still farther from the section where your friends will soon be searching for you. After all, a night in the woods is not often a serious matter, especially if you can locate drinking water, collect enough fuel for an all night fire and find or erect some sort of windbreak or shelter.

There is need, among out-doors men, for a uniform code of distress signals. At present different combinations are in use. The most satisfactory ones that I have encountered are: one shot, a lapse of ten seconds and then two shots in rapid succession; or two nearby smoke columns.

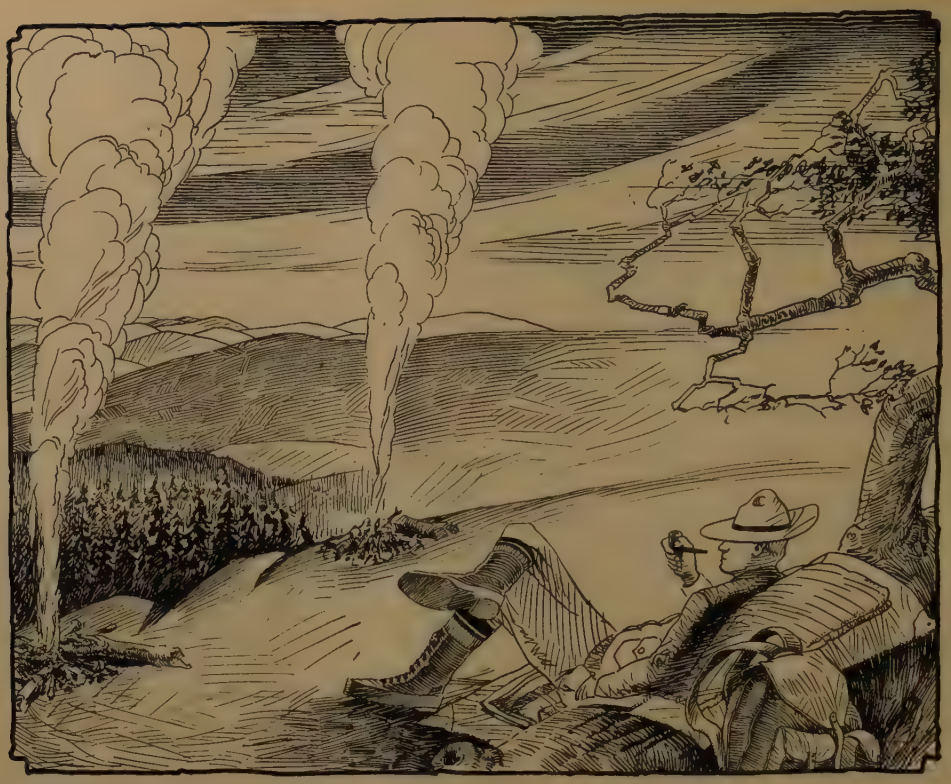
Every venturesome camper with an explorer's bent should always carry, in addition to his maps and compass, matches in a water-proof match box and a strong knife, or, better yet, a hatchet.

There are hazards, other than that of being lost, against which the camper must be on guard. He should be able to recognize the poisonous plants of his region, that he may not, as did one friend of mine one night on a Canadian canoe cruise, pitch his tent in the midst of a bed of poison ivy. He should not only know the poison ivy, but also the other poisonous species of *Rhus,* poison sumach and poison oak. Ability to distinguish between the poisonous and non-poisonous snakes is another part of the essential nature lore equipment of the skilled camper. Of course the exaggerated fears possessed by so many adults are as unnecessary as they are unfortunate. We have no poisonous reptiles in this country that will deliberately attack man, and very few authentic records in the northeastern section of the United States of fatal results from bites of the poisonous snakes.

The porcupine can not "shoot" his quills like arrows at even the most unwelcome invader of his stamping ground, but he can, and frequently does, gnaw a hole in a moccasin carelessly left outside a tent, or chew up an axe helve or paddle shaft left unguarded. It is well to scrutinize nearby trees critically before pitching one's tent to make sure that there are none which would be likely to crash down if a high wind arose.

When climbing, remember that the mountain top that comes easily for you may be taxing the physical abilities of your partners to the utmost. Therefore be sure to adapt your pace to that of the weakest climber in the party. Also if you have been so unfortunate as to pass a fairly sedentary winter, or have not had an opportunity of climbing for several years, do not start up your first mountain at the same rate you ascended the last one when in the pink of condition at the end of a summer of mountain climbing three or four years ago. There are hearts—and hearts!

The digging of simple trench latrines and the disposal of garbage has been discussed in a preceding article. However, one is often confronted with the problem of



waste disposal when no tools for digging are available. In most sections this problem can be easily and effectively solved by locating a rock of suitable size embedded to a considerable depth in the earth, which can be pulled up leaving a good sized pit that later can be covered with earth or by the original rock.

The mountaineer, even more than the canoeist, will need to travel light because all of his baggage must go on his back. Especially if he is off for a trip of three or four days he must critically consider the need for each article that adds a fraction of a pound to his load, and discard everything except the absolute essentials. There is little exhilaration in mountaineering after one's pack goes above thirty or thirty-five pounds, and most of us are decidedly happier if the pack is lighter. Therefore when pack animals, or packers are not available I do not recommend extended trips, unless one can, as it were, "refuel" frequently, or else establish a base camp near the source of supplies and radiate trips from this base. This latter plan can be employed very effectively, for example, among the high peaks of the Adirondacks where the base camp can be established at one of the lean-tos erected by the New York Conservation Department. Incidentally the construction of these lean-tos by the state and of other huts and over-night shelters by various mountain clubs makes it possible for mountaineers to explore many sections of our Appalachians without the necessity of carrying tents.

If tents must be taken along, they need not be heavy and bulky. For extreme lightness, tents of balloon silk, Egyptian cloth or other light-weight, water-proof fabrics are best. As to shape, the half pyramid probably represents the most efficient use of material, although there are other good designs. The "Royce Tent", described by Horace Kephart in Chapter VI, Volume I, of his "Camping and Woodcraft," is large enough to accommodate three people and weighs only four pounds. A detailed description of several other light weight tents will be found in the same chapter.

Bedrolls and sleeping bags offer the greatest opportunity for conserving weight. Of course they will need to vary with changing seasons, but as long as temperatures do not go below freezing, rolls that weigh no more than eight pounds should be sufficient if the best materials are used. By "the best materials" is meant a light weight outer fabric (water-proof, like tanalite, if you do not carry a tent) and insulating puffs, comforters or blankets of eiderdown, camel's hair or wool. Essential characteristics of satisfactory sleeping bags are the ability to be completely opened for sunning, the possibility of adjustments for warm or cold nights, and room enough for comfortable sleeping without any waste of materials.

In general the clothing recommended as suitable to carry on a short canoe trip will serve for the hiker. It will be necessary to eliminate some articles, and wherever weather-proof qualities can be retained and weight reduced this should be done. For example, I have used for eight years a large, so-called "Alligator" raincoat that weighs only one and one-eighth pounds and folds into a packet six inches square by one inch and a half thick. Particular attention must be given to footgear. Shoes should be old friends, well broken in, and yet not so worn that a heel will pull off, a sole rip loose or seams open. Except for bad snake country, I see no need for tops over eight or ten inches high. Greater height only means useless weight.

Cooking gear will be less luxurious than that suitable for a canoe trip. One light (Continued on page 40)

THE PROGRESSIVE STAGES IN THE EMERGENCE OF THE TURTLE

First the cutting of a slit in the tough egg; then a turtle hand comes through, to be followed by another; then a heave with both hands and, finally, Chrysemys steps forward into a new world

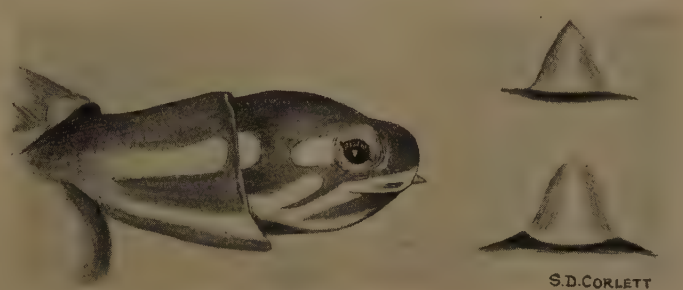
CHRYSEMYS HATCHES HIMSELF

BY SPENCER D. CORLETT

CHRYSEMYS MARGINATA was anxious to be born. At least we must assume that he was, because it is difficult to understand why any common "mud turtle" would prefer a cramped shell, tucked away in the cold November loam, to a life of freedom in a world of sun baths mixed with other delectable forms of plain and fancy loafing. But it was close to Thanksgiving and the little fellow, which should have crawled forth several months earlier, was yet in its leathery shell.

An accident, however, averted the impending tragedy. The turning of a spadeful of earth had exposed the home nest, and our hero and his brothers and sisters were rudely brought to the premature light of day. Several of the eggs had been destroyed by the upheaval but the four remaining intact were placed in the hands of Dr. Raymond C. Rush of Hudson, Ohio, who knows and loves all wild things.

The doctor decided that "Little Crooked Legs" should be born then and there. It was the only decent thing to do. The eggs were placed near the furnace where a June warmth soon penetrated the tough, cream-colored shell. After several days the doctor removed one egg, poured warm water over it and patiently watched the result.



THE TURTLE POSES FOR A PROFILE

Note the little temporary hatching tool on what would be an upper lip. It is shown enlarged, being rounded from one view and pointed from another

"Out at last!" exulted the awakening Chrysemys, as he tingled with the new warmth. He was encased in a nearly oval shell about one and three-eighths inches long by thirteen-sixteenths inch in diameter at the center, a shell so pliable and yet so leathery that it is difficult to tear it with the human finger nail, but he attacked the problem with a will. He began by rubbing the shell with his head slowly from the exact center of the shell's point toward his left foot, back and forth, slowly back and forth, for three or four minutes. Then he rested two or three minutes and resumed the operation, always working his head in the same plane. In a little over half an hour a horizontal slit a quarter of an inch long appeared where his head had rubbed, and a tiny, ghostly-gray forepaw emerged and gripped the lower edge of the slit.

Again his head moved slowly back and forth on the inside of his prison, but this time from the center toward his right foot, with the usual periods of rest and refreshment between labors. An hour after the first movement had been noticed, the doctor saw the right foot push forth and grasp the lower edge of the right-hand slit. Then ensued a half hour's rest and recuperation period, with nothing visible except the two little feet clutching the edge of the opening.

Suddenly there was a mighty, convulsive movement, a giant push, and *Chrysemys marginata* boldly thrust himself out of the sac and pushed it disdainfully back of him. Born at last, but what a sight! A pulpy gray mass—showing none of the brilliant vermillion and cream on black that we know in "mud turtles"—rather slimy, half blind, a shapeless thing, dragging a portion of his yolk sac with him, but *born*, and proud of it.

In twenty-four hours the gray roof over his back gradually flattened and hardened somewhat, and the gay, contrastive colors appeared to proclaim the species. It was days before the yolk sac was finally absorbed, but when it did disappear, not a trace of a navel could be found.

"I have seen many kinds of birds break their brittle shells," remarked the doctor, "but I had never seen a tortoise rupture that tough, elastic casing, and I have often speculated on how he could accomplish it. None

of our biologists has bothered to go into detail, and if they knew the technic of the thing, you would think they might have mentioned it, because the details are most interesting. Do you see anything peculiar about that tortoise's nose?"

I examined the nose carefully by holding the active little chap very gently—his shell was still quite soft—and I could plainly see a tiny cream-colored, conical protuberance on the end of his nose, just above the upper lip—if you can say that a tortoise has a lip.

That apparently conical horn is as sharp as a needle if you view it from the side through a low-power microscope, but seen from top or bottom it ceases to be a true cone and appears rounded, much like the business end of one of those prehistoric "scrapers" or "skinning tools" we find so plentifully in Ohio fields. It is, in fact, almost spatulate, and cuts only when moved sideways. In the three subsequent "births" at which the doctor also played obstetrician, the pre-natal movements were identical, just as I have described them for the first tortoise hatched. As the doctor pointed out, however, these few observations do not necessarily establish a rule, typical though they may be and probably are. Many more hatchings must be watched, timed and checked, before a universal rule can be announced with certainty.

It is interesting to note that this embryonic beak soon disappears, probably by being absorbed to form a part of the upper jaw, and not a trace or scar apparently remains. Now the doctor is planning on hatching some snake eggs to see if snakes employ the same method, and it is possible they do, because of the close relationship between reptiles and birds. It is hoped, now that the problem is announced, to hear of solutions from others confirming the findings so far observed.

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A FEATHERED "SEPTEMBER MORN"

BY ADA CLAPHAM COVAN

PROBABLY many bird-lovers are already wondering, "Will this bird or that bird return again this summer?" For me, it will be a happy time if a certain dainty lady again visits the old watering-pan, as she did twice daily for twelve weeks last year.

On June 3 I was looking out at "the tangle"—a fifty by fifty foot wooded stretch of yard, left "as is", for the birds. A pedestal bird-bath, a pie plate, and a large dripping-pan, filled with water, stood within its shade, and, despite my window being barely a dozen feet distant, were in constant use.

Cautiously picking her way over the mossy path, came a shy woodland sprite gowned in olive brown, wearing numerous splotches on her snowy breast, and a sunny patch jauntily crowning her pretty head. I could almost hear the rustle of tiny starched petticoats as she picked her primly dainty way to the water-pans. Then, giving one last quick glance around—the inborn caution of all wild creatures—with a soft "plop" she stepped into the water. She was Mrs. Oven-Bird—most elusive and lady-like of all the woodland creatures that have deigned to call on me. For several minutes she cavorted with all the abandon of a happy child. Finally she stepped primly forth from her bath—but what a change! The lovely, sleek little bird, that had come to me through the tangle not five minutes before, walked away drenched from top to toe, with every sunny "hair" on her head standing on end.

This happened at 10:30 A.M. At 4:30 P.M. back she came and went through the same performance. She missed only four days during twelve weeks' time, and her call did not vary more than thirty minutes. Thus did she endear herself to me—and then I missed her, and finally placed her in my book of sweet memories.

On September 26, a flock of olive-backed and hermit thrushes came for a three days' stop-over among the poke berries. One tiny thrush with a strangely brilliant crown went straight to the water-pan, and—after glancing around—proceeded to take her bath. It was my oven bird—no longer a memory—but an even sweeter reality.

FISHWORMS "BOILING" OUT

HOW THE ANGLER TAKES ADVANTAGE OF THEIR HABITS

BY W. L. McATEE

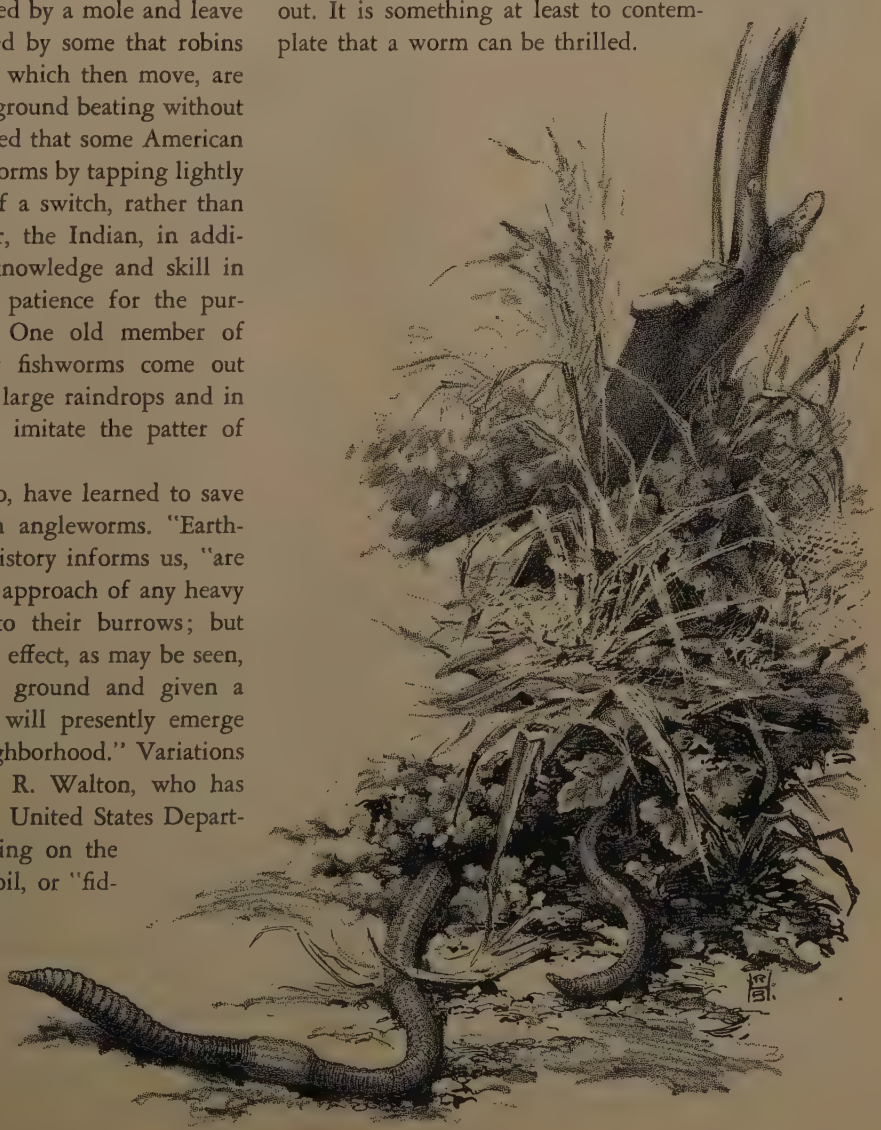
ILLUSTRATED BY R. BRUCE HORSFALL

IN YOUTHFUL angling days when my grandfather did the spading and I the worm picking, I noticed that worms came hurriedly out of the soil at some distance from the spade. Since then I have seen the same "boiling" out around a post being driven into the ground. We may not be able to say why this happens, but it is of interest that fish- or earth-worms do something out of the ordinary, and that men have learned to take advantage of the reaction.

Charles Darwin, who studied earthworms a great deal and wrote a book about them, records a popular belief "that if the ground is beaten or otherwise made to tremble, worms believe they are pursued by a mole and leave their burrows." It is even believed by some that robins in hopping about disturb worms, which then move, are seen, and captured. Darwin tried ground beating without result, but we are credibly informed that some American Indians get their supplies of fishworms by tapping lightly on the earth. Maybe gentle use of a switch, rather than beating, is required; and, further, the Indian, in addition to having possibly greater knowledge and skill in managing worms, has plenty of patience for the pursuit and all the time there is. One old member of the Mississinewa tribe said that fishworms come out when there is a scattering fall of large raindrops and in tapping the ground, he tried to imitate the patter of the rain.

Some pale-faced fishermen, also, have learned to save spade work by playing tricks on angleworms. "Earthworms," the Standard Natural History informs us, "are sensitive to vibrations and on the approach of any heavy body they withdraw quickly into their burrows; but some vibrations have the opposite effect, as may be seen, when a stick is thrust into the ground and given a twirling movement. Earthworms will presently emerge in numbers in the immediate neighborhood." Variations of this method recorded by W. R. Walton, who has written about earthworms for the United States Department of Agriculture, are: knocking on the sides of a stake driven into the soil, or "fiddling" on it by rubbing a thin board across the top of the stake.

The adaptation of even the most modern methods to getting fishworms has not been neglected, for there is an electrical worm digger on the market. Mr. Walton has studied and reported upon this also and finds its efficiency "low at best." Some failures in getting results from these labor-saving methods of collecting fish bait may have arisen from poor judgment as to what is good angleworm territory. None of the devices can be expected to bring forth worms when there are no worms. Granted a good worm pasture, however, perhaps any of the schemes will work. Why? Some suggestions as to why have already been given, but it may be as good as any to say that rain patter, soil switching, earth vibration or electrification, give the worms a thrill that stimulates them to "boiling" out. It is something at least to contemplate that a worm can be thrilled.



BIRD'S NEST FUNGI

AN INTERESTING BUT NOT RARE GROWTH IN THE WOODS

BY EDDIE W. WILSON

THOSE of us who wander in the woods, fields and marshes may see many things or few, depending, of course, upon how much we are looking for, or how awake we are to the myriad of fascinating things of Nature that are about us. The flash of a colorful bird or the startling beauty of a lovely wild flower, we are likely not to miss. The beauty of an ancient oak or the flash of a rabbit across our path are things which force themselves upon our attention.

But there are an infinite number of things of beauty or interest that Nature hides from all, except those with an inquiring mind and an alert eye. Many of us will see a patch of moss and dismiss it just as a pretty and soft looking growth on an aged tree or ancient boulder. If we stop to look closely, either with the eye or through a pocket microscope, we will find its form, and the tiny trees that go to make up the whole, well worth the minutes spent in making the acquaintance of the moss. So it is, also, with vines and ferns and many diminutive wild flowers.

There is one group of Nature forms missed by perhaps more people than any other. These are the fungi. It is a fascinating and a varied group, and one of its most interesting members is the *Crucibulum vulgare,* or bird's nest fungus. Look closely on rotting stems or fallen forest leaves and perhaps you will see attached to them some little light brown pouches. Or, perhaps, you will come upon this fungus at a stage when the pouch has matured and the top has burst, forming a trumpet-shaped "nest." Inside this "nest" you may find what look like tiny, glistening white eggs. These are the spore cases and are attached to the "nest" by little, thread-like cords. This fungus is not at all rare and any keen-eyed observer should be able to find some on a walk in the woods in his vicinity.

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LITTLE KNOWN INSECTS

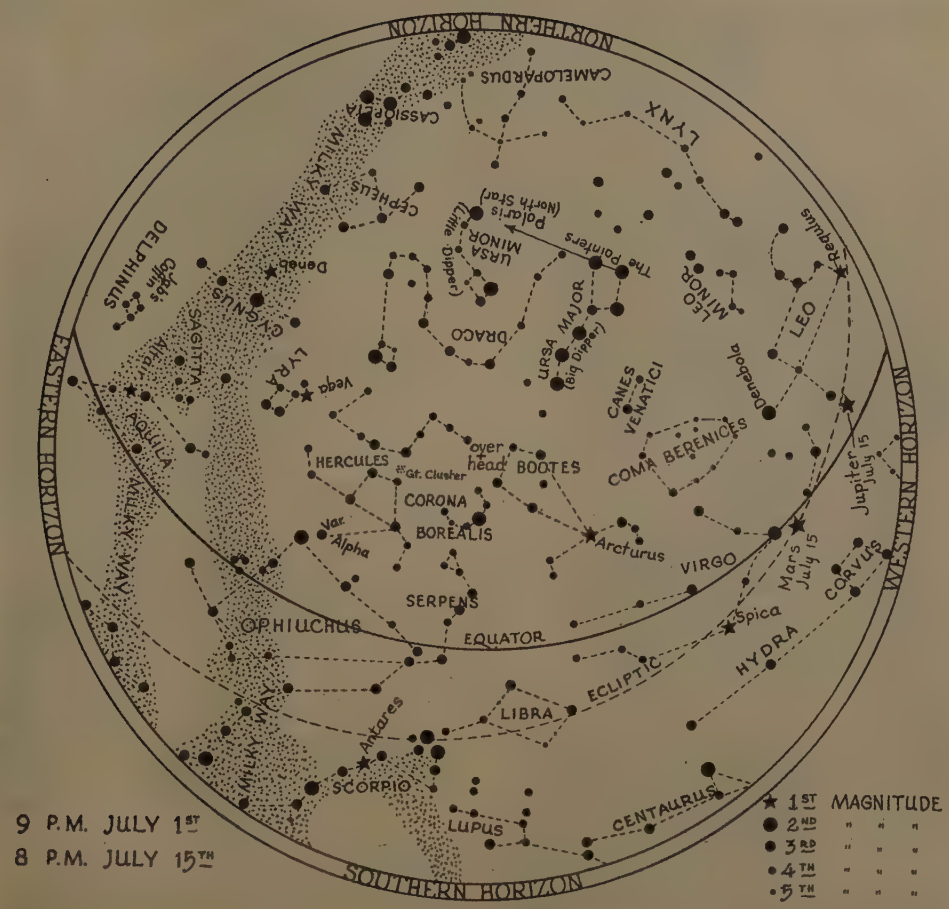
BY S. F. AARON

AMONG the vast number of Hexapods there are a great many about which we know little concerning the developmental stages. These include all orders and most families and are largely the smaller kinds least significant economically.

EVER SEE THESE?
The adult bark fly and the young, both here pictured greatly enlarged in size. Keep a lookout for them

The little bark flies (name is mine for want of a better common term), of the order Planiptera, and known to the systematists as the family Psocidae, have long been known to exist; between twenty and thirty species of a dozen genera have been found and described in North America. But their life histories are decidedly remote, even misunderstood regarding certain forms. All quite small, the largest kinds less than a fourth of an inch in length and the smallest barely discernible except by a magnifying-glass, they have naturally escaped general notice. The best-known form, wingless, is the tiny book louse found in all houses; the winged species are of the greater number, living in colonies commonly on the bark of dying trees and branches, some of them building loose webs for partial protection. Their food seems to be mold and microscopic lichens.

This brief mention is given as an invitation to sharp-eyed students who are seeking to add to entomological knowledge in a field not much explored.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south

OUR SUN AND HIS NEIGHBORS

BY ISABEL M. LEWIS

THE sun has a large and important family, or at least so it seems to us. There are the nine major planets, with possibly a few more on the outskirts of the solar system still to be discovered. Named in the order of their distance outward from the sun, we know them now as Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune and the recently admitted new member, Pluto. Then there are the satellites, or moons, attendant on the planets—one for our Earth; two for Mars; nine for Jupiter, and an equal number for Saturn, not to mention the countless, tiny moonlets in the three Rings of Saturn, four for Uranus and one for Neptune. Then there are the comets, hundreds of them; and the swarms of meteors, all small fry of the solar system pursuing their own courses around the sun, the great central body that holds them all under its sway. Between the orbits of Mars and Jupiter are also additional hundreds, possibly even thousands of bodies ranging in size from the largest, nearly five hundred miles in diameter, known as Ceres, to the smallest fragments, five miles or less in diameter, called minor planets or asteroids.

All these numerous and varied bodies—planets, asteroids, moons, comets, meteors—make up the sum total of that which we call "our solar system," a single unit in the greater system of the stars which we speak of as the galactic system. That is the system of thousands upon thousands of stars, luminous and dark, as well as great gaseous nebulae of enormous size and extent, that form the Galaxy or Milky Way, a portion of which we may see arched across our eastern sky these summer evenings. Just as our sun, with all its attendants, is only a single unit in this greater system of the Galaxy, it in turn is but one of similar aggregations of stars such as the Magellanic Clouds or the great island universes which lie at enormous distances exterior to the Milky Way system.

We think of our solar system as of great size and extent, and so it is—measured in miles. The distance of

the earth from the sun is about ninety-three million miles and this is called the astronomical unit. Pluto, the outermost planet, is at a mean distance of thirty-nine astronomical units, that is thirty-nine times ninety-three million miles. It takes light, travelling at the rate of 186,000 miles per second, more than eight minutes to travel from the sun to the earth and nearly five and a half hours to reach the orbit of Pluto. How great is the distance that separates the solar system from its nearest stellar neighbor may be judged from the fact that it takes light nearly four and a third years to make the journey. Across the solar system light travels in less than half a day but to reach the nearest star it requires more than four years. When one considers, then, that the distance between the solar system and the nearest sun, or star, is more than three thousand times the extent of the solar system itself, it is little wonder that the solar system has ample room to continue its journey through a system of stars all in motion without colliding with or even closely approaching another sun for millions upon millions of years, as it is known that it has done in the past.

Some statistics have been gathered by astronomers regarding the nearest neighbors of the sun. It is rather easy, in general, to pick out these close stellar neighbors of ours because they have what is known as a large "proper motion," or individual motion across the sky. Such stars appear to be moving more rapidly than the average star. In fact the average star appears, viewed by the naked eye from year to year, not to move at all. It would take more than a lifetime for one to note without telescopic aid any change in position of the most rapidly moving of the nearest stars. Yet viewed telescopically these nearest stars reveal an unusual motion and it has been possible to pick out about thirty stars that are within sixteen light years of the sun. One light year is about six million million or six trillion miles. So these close stellar neighbors of ours are not more than ninety-six trillion miles away.

These stars differ tremendously from one another both in apparent and true, or intrinsic, luminosity. All of them, with the exception of Sirius, the brightest star in the heavens, Procyon, and Altair, are faint dwarf stars. The star known as Wolf 359, the fifth nearest the sun, about eight light years distant, is intrinsically the faintest star known. It would take fifty thousand such stars to give as much light as our own sun.

The nearest star of all is Proxima Centauri, also a very faint star. Its luminosity is estimated to be only one twenty-thousandth part that of the sun. Its distance is 4.26 light years; that of Alpha Centauri, one of the twenty brightest stars and long known as the nearest star, is at a distance only slightly greater than Proxima Centauri, or 4.29 light years. The next nearest star is known as Barnard's Star because it was discovered by the late Prof. E. E. Barnard. It has the most rapid motion across the sky of any known star. This, in itself, was an indication that the star was in all probability a near neighbor of the solar system, and measurements of its distance showed that it was the third nearest star and only a meager six light years distant from the earth.

The three giants among these nearest stars are also among the twenty brightest stars. They are Sirius and Procyon, the two Dog-stars, and the star Altair in the constellation of Aquila, The Eagle. It rises in July early in the evening. Sirius, which is the equal in light-giving power of twenty-eight suns as bright as our own, has a faint companion that gives forth less than three-thousandths as much light as the sun. The two are at a distance of 8.8 light years. Procyon, in the constellation of Canis Minor, The Lesser Dog, gives forth five times as much light as our sun and it also has a companion star even fainter than the companion of Sirius because its luminosity is estimated to be only eight-hundred-thousandths of that of the sun. Thus it would take 12,500 such stars to give forth as much light as our own sun.

Procyon and its companion are at a distance of 10.5 light years from the earth. They are eleventh in order of distance from the earth.

Altair has nine times the luminosity of the sun and is at a distance of sixteen light years. Like our own sun, it has no companion star. It is a really remarkable fact, however, that among these stars that lie within sixteen light years of the earth, fifty per cent have companion stars, and several have more than one companion star. Alpha Centauri is a fine double star. The brighter of the two stars also has a close companion which revolves around it in a period of 81 years. These two stars are too close together to be seen separately, even in the most powerful telescopes, but the spectroscope reveals the presence of the companion star and also shows that the two are approaching the solar system at the rate of nearly fourteen miles a second. These two stars, combined, give forth about a tenth more light than our own sun, but the second star in the Alpha Centauri system, which forms a fine double star with the brighter star, easily visible in the telescope, gives forth only about three-tenths as much light as our own sun.

One of the most interesting of our near stellar neighbors is the star known as 61 Cygni, which was chosen by the astronomer, Bessel, because of its rapid motion across the sky in his first attempts to measure stellar distances. He assumed that its rapid motion was due to nearness and that its parallax, the small angle upon which the direct measurement of its distance depends, would, therefore, be comparatively large. He was successful in his attempts to get reliable measures of this angle. That was nearly one hundred years ago and it was the first star distance to be determined successfully. Shortly after, the distance of Alpha Centauri was also successfully determined at the Cape of Good Hope, and now the distances of hundreds of stars have been determined by direct measurements of these small angles as well as by other methods. 61 Cygni is now known to be the thirteenth star in order of distance from the sun and its distance is nearly 11 light years, that is, its light takes nearly eleven years to reach the earth travelling at the rate of 186,000 miles a second. That is equivalent to saying that 61 Cygni is at a (Continued on page 41)

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LIGHTNING BUGS

GREAT-AUNT MARY TELLS ANOTHER STORY ABOUT MEMBERS OF THE "BUG" FAMILY

BY MARY M. CUTTER

"WELL look who's here!" exclaimed Carlyn as the children gathered in the swing on the end of the living room porch. Of course we all looked and there on the bottom of a bottle, walking around and looking for a door or window by which to make his escape, was a Mr. Firefly. Calvin had caught him.

"Tell us about *him* this time," they all cried in chorus. So Great-aunt Mary began.

"Fireflies belong to the family 'Lampyridea,' or 'Riding lamps.' This seems a very good name for them because they each wear a tail light like Daddy's car. And like the auto drivers they have dimmers and use them when approaching each other in the darkness. They hide themselves all day. Maybe they are shining up their little lamps and filling them with phosphorescent oil and getting them ready for the evening's frolic. Anyway, as soon as the shadows fall and night begins they are seen first of all in the grass and bushes. Then they rise higher and higher, even up to the tree tops, with their little lights shining brightly."

"Maybe they are looking for something," ventured Jane.

"Maybe they are like old Diogenes whom we read about in my Christmas book," said Junior.

"In some countries," continued Great-aunt Mary, "the natives gather gourds and punch them full of holes. Then they fill them with fireflies and hang them up, where they shed a soft light. In the West Indies the dusky maidens of some tribes fasten them in their hair, where they shine like sparkling jewels. In olden times some tribes of Caribbean Indians used to gather a lot of fireflies and crush them and anoint their bodies with this oil which caused them to glow in the darkness and scared their enemies away.

"In Japan firefly hunting parties are a favorite pastime on autumn nights. These parties are given

MR. FIREFLY FILLING UP HIS LAMPS WITH OIL AND GETTING READY FOR AN EVENING'S FROLIC

on the river banks or in public flower gardens where the ground is covered with autumn flowers and grasses. The fireflies are handed to the guests in paper bags and at a given signal they are set free in bright swarms. Soon they are darting about among the flowers and bushes. It must be a very pretty sight."

"I want to play that game," cried Calvin.

"I guess you will have to wait until we can all go to Japan," laughed Jane.

"What makes the light?" asked Junior.

"There is still some mystery about that," said Great-aunt Mary. "For a long time it was thought that it was oxygen from the air meeting fatty tissue. Then people studied more and now it is thought to be something that the insect has inside meeting what he has eaten. It is all very wonderful and one of those mysterious things in Nature which make it so much fun to study. It is also

AN ENLARGED LOOK AT MR. FIREFLY IN WHICH YOU SEE HIM FROM THE TOP

thought that the light is a means of introducing Mr. Lightning Bug to Mrs. Lightning Bug."

"How romantic," observed Carlyn.

"I think it is quite lucky for us that it is the harmless little firefly who carries a lantern instead of the mosquito, because then we could not hide from him at all," remarked Mother, who had been listening to the story.

"But," said Carlyn, "if he had a light we could see him coming and swat him, couldn't we?"

And both Mother and Great-aunt Mary thought that was a very sensible question.

THE UNDERSIDE OF THE FIREFLY, THE WHITE AT THE LOWER END BEING HIS LAMP

• • •

SOUTH WIND'S FIDDLE

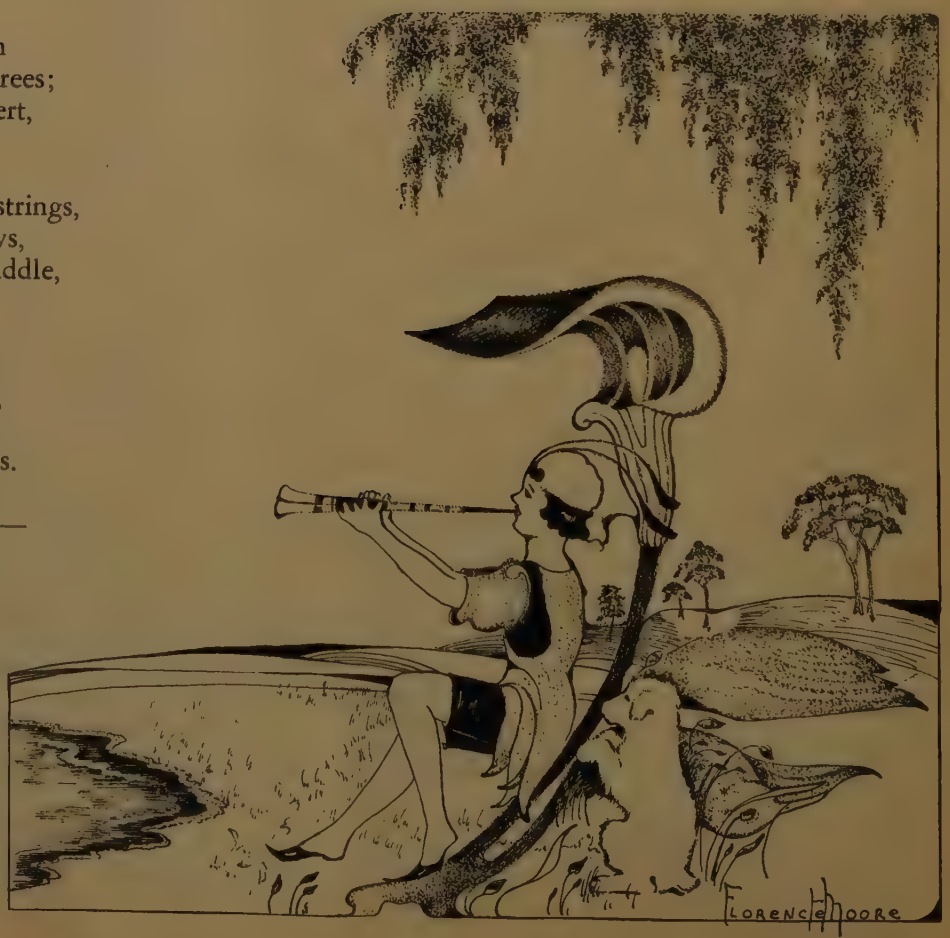
BY FLORENCE H. MOORE

There's a soft commotion
Stirring now among the trees;
Let us hasten to the concert,
Of the little leaves.

They're tuning up their strings,
They bend their tiny bows,
On South Wind's fairy fiddle,
As merrily he goes.

Tiptoe, lest we miss it—
We must be quiet, please,
To hear the little fiddlers
Play their happy melodies.

There's some singing too—
What—might—it—be?



PUZZLE: Find jolly old South Wind, directing Babs, who is playing the Pipes of Pan. Also find Bobolink and Brown Thrasher, the two singers.

Oil Pollution

Dr. Alfred O. Gross is widely known for his studies of the heath hen—now extinct—and these have made him a virtual resident of Martha's Vineyard, Massachusetts. We appreciated his letter, reproduced below, and his pictures illustrate graphically the menace of it. Dr. Gross writes:

"I was greatly pleased with your statement on oil pollution in the May issue of NATURE MAGAZINE. I visited the Island during the last two weeks of March and while not engaged in the search of the heath hen I made a study of the oil pollution.

"When I visited the south shore there was an estimated number of 2000 eiders, scoters and other sea ducks washed up on the sandy beach along the south shore. Many others were buried in the sands thrown up by the waves of previous storms. Several birds in a helpless condition were seen on an exposed ledge and were so far gone that they appeared indifferent to our presence. There were rafts of ducks, chiefly eiders, numbering between 500 and 1000 individuals riding the waves off shore. As far as I could determine the latter were in good condition and whether or not they succumbed to the same fate as that of the birds shown in the enclosed photographs is conjectural. I was told by several residents of the Island that all that I saw was not an unusual circumstance and if true the loss of ducks during the course of the winter is appalling. The oil is killing more of these birds than all the guns of the sportsmen.

"No one could witness the destruction of the beautiful eiders on Martha's Vineyard without being impressed with the fact that oil pollution is a real menace to our sea ducks.

"I hope that you will push this matter with even greater vigor than you have in the past."

VICTIMS OF THE OIL OFF MARTHA'S VINEYARD, A CONDITION CAUSING GREAT LOSS OF BIRD LIFE ON BOTH OUR COASTS. IT WAS THE SUBJECT OF NATURE MAGAZINE'S EDITORIAL IN MAY

The Dumb Actor Gets a Break

At last there seems to be a prospect of seeing dogs in a movie short without benefit of "tricks," pants, or other undoglike trappings.

The prospect comes in the form of a series of movie shorts entitled "Jock and Jill," which features two live Scotties. The first of the series will shortly be released nationally.

Morgan Dennis, well known both here and abroad for his appealing etchings and illustrations of dogs, is the producer and he has employed the same theory in making his movies that he has always strived for in his etchings. That is, to have the dogs natural, to allow them to be themselves.

Knowing the cruelties necessary to get a dog to perform in the vaudeville manner which in the past has seemingly been accepted in Hollywood as the routine procedure, Mr. Dennis determined to approach the making of his pictures from a different viewpoint.

Reasoning that people loved dogs for what they were—that is, dogs—he saw no reason why the canine actor would not be just as appealing if he didn't act and jump through hoops, but just conducted himself like a real dog.

The result has justified the theory, according to Mr. Dennis, and the Scotties, instead of being mistreated, thoroughly enjoyed the experience, with everyone from the director to the stagehands making their life a veritable bed of roses.

Wise Planting

With corporations and individuals becoming more and more conscious of the value of reforestation to the country, it is interesting to note the leadership being taken by the Buck Hill Falls Company located in the Pocono Mountains of Pennsylvania in this important work. During the past three years, this Company, which controls a three hundred room resort hotel and one hundred and seventy-five cottages and a three thousand acre estate, has planted a total of seventy-eight thousand trees. Whenever vacant land has been found on the estate, and in cases where the present stand is inferior, young trees have been set out. These have been small seedlings which some day will make a great showing and add materially to the value of their property. Red pines, Scotch pines, white pines and Norway spruce are all included, with the latter being primarily the favorite.

The Heath Hen

After an exhaustive search by Dr. Alfred O. Gross it seems conclusive that the last heath hen has gone to join the group of extinct bird species. The last authentic date upon which the one remaining bird was seen was March 11, 1932, and this bird had been the sole survivor of his race since December, 1928. Two metal bands marked the bird and a reward has been offered to the person who finds and delivers the last bird, thus definitely closing the chapter on the heath hen. In Volume Ten of NATURE MAGAZINE, pages 88 to 92, there will be found a complete and well-illustrated article about this bird and its habits. This article is now historic and may be reread with a feeling of sadness and a realization of what man does to Nature's forms.

Nature School

Meeting in Sequoia National Park from June 18 to 28, the West Coast School of Nature Study will hold its 1933 session. The school is one phase of the Nature Study services of the Natural Science Department of the San Jose State Teachers College. Enrollment is limited and the cost low. Information may be obtained from P. Victor Peterson, State Teachers College, San Jose, California.

National Tree Vote

Some confusion seems to have arisen as to the closing date of the poll being conducted by the National Life Conservation Society for the popular selection of a National Tree. This vote will continue throughout 1933, and votes and information about the vote may be obtained from Mrs. Charles Cyrus Marshall, 2239 Tiebout Avenue, New York City.

HARVESTS OF THE BEACH

(Continued from page 16)

slugs are the nudibranchs—pronounced nūd'ī-brynks—and so-called because the gills are external, the word nudibranch meaning naked gills. It is these external gills which give added beauty to the creatures. Anyone can find them on sea weed in shallow pools left by the tide. Find a frilly bit of exquisite coloring, blue, yellow, rose, orchid, rust—and it is surely a nudibranch.

The largest sea slug, not a nudibranch, and not especially pretty, is commonly called a sea hare and may grow to be fifteen inches in length if it lives long enough. It is brown in color tinted with green or red, and is usually blotched. When molested, it ejects a purplish fluid into the water.

Other members of the Gastropoda all bear shells, the form of which varies from the very flat spire of the button shell and abalone to the long, steeply-twisted spire of the auger shell; from even exteriors with slightly accented spiral grooves to the rough frog shell with deeply cleft whorls that are in turn notched and ridged; and from the greatly twisted wentle-trap to the smooth appearing cowry which hides its spiral on the inside.

They vary also in size. At one extreme are the tiny chink shells, miter shells, wheat grains and rice grains, and at the other the large nine-inch abalone and the over-sized moon snails. The bleeding tooth shells are sea snails with glossy skeletons pleasingly marked with black or red and black zig-zigs on a white background, and a bright yellow tip. In the opening are two little tooth-like projections surrounded by a blood-red blotch.

A rocky, barnacle-encrusted ledge left exposed at low tide may be found almost covered with little spiral snails of about three-fourths of an inch in length—all there for a purpose. They are rock snails busily intent on devouring the barnacles. Spiral ridges in alternating bands of brown and yellow mark most of the shells, but some are in orange and white bands, some are pure white and some are almost black. The purple olive is a pretty little shell, three-fourths of an inch long, with a highly-polished surface in a soft gray brown with traces of purple.

"Clams for dinner today," says the big moon snail, and he puts his huge foot over a clam until it is suffocated and then devours it. The shell of the southern moon snail found on California beaches is pure white, while the larger Lewis moon snail pictured here is golden-brown outside, and iridescent chocolate color inside.

The abalone is a univalve and a spirally-coiled shell at that, but the spire is so flat with just the merest suggestion of a stingy twist that one wonders if perhaps the zoologist were not working his imagination over-time when he called it a spiral shell. The dull, drab exterior of an abalone shell gives no hint of the iridescent mother-of-pearl lining inside. When the animal is removed—and excellent steak it makes—this beautiful, satiny interior finish is revealed.

The nut-brown cowry is a golden, highly-polished chestnut brown on the posterior side shading off into white on the ventral side. The toothed edges are folded in, and the spire is completely hidden on the inside. The familiar coffee beans are really small cowries.

The chiton, also called butterfly and sea cradle, is not a gastropod. It is a representative of the Amphineura, those forms made up of eight plates laid edge to edge to make a spoon-shaped suit of armor. When the animal is removed, the interior is seen to be of a soft, delicate, pearly pink, indeed like a satin-lined cradle.

Squid, octopus, pearly nautilus, three cousin cephalopods, are alike in having long arms with suction disks on the tips, and large bodies bearing eyes. The pearly nautilus and paper nautilus carry shells, but the squid and octopus do not.

Octopods are sometimes called devil fish and are familiar to most of us who, all too unfairly, perhaps, despise them, and then add insult to injury by calling them "fish" instead of mollusks. However, even though they are true mollusks, the just mentioned "most-of-us" are doubtless quite willing to leave them out of our collection of shells.

THE WILD LIFE RECORD OF ANCIENT POTTERY

(Continued from page 22)

hoppers, and beautifully-drawn butterflies.

Lizards, frogs, horned toads, turtles and a variety of snakes represented the reptile kingdom. The birds pictured included curly-billed, longlegged cranes, hawks, eagles, turtle-doves, quail, turkeys, and parrots. Most of the specimens of fish are unidentifiable, though river trout is often shown, evidently taken from the cold, swift-flowing Rio Mimbres. Bear, mountain lion, deer, antelope, coyote, fox, possibly wildcat, jackrabbit, cottontail, bats, and small rodents are found on hundreds of bowl interiors, demonstrating what mammal life abounded in that region.

When checked against the bones found in the fill between fallen walls, it is seen that the ancient Mimbrenos did not exaggerate the abundance of wild life which found its habitat in the rather more fertile valley. Hence these aborigines were not dependent on the products of their agricultural ability alone. The pictures, painted on the concave inner surfaces of clay vessels, are amazingly lifelike in expression, though naturally they are conventionalized along traditional Indian motifs. They seem to have been intended more or less as caricatures.

Their value as evidence is readily appreciated when it is seen that a complete record of human activities and a picture gallery of natural history are preserved in such bowls. It is not definitely known if the Mimbres people had dogs, as the bones of such animals have not been found in their remains, but the effigy handle on the corrugated bead-bowl illustrated seems to suggest that they did own such pets. Turkeys and parrots were probably domesticated, though the latter are now unknown in this region. Hunting with stone spear and arrow, as well as the trapping of rodents and snaring of birds, is frequently illustrated on Mimbres ceramics.

TRAMPING THE WOODS

(Continued from page 30)

aluminum kettle will serve for soup, cereal, or vegetables. A smaller coffee pot and a frying pan will complete the kit. When traveling light, I have often made a frying pan serve in place of a reflector oven by putting my cornbread mixture or biscuit dough into the frying pan, holding it over, but not too close to the coals until the mixture was firm enough so that the pan could be propped up on edge in front of the fire where the baking was completed.

The following menus were worked out for a four-day mountaineering trip for a party of three. It was planned that the group would leave after breakfast on the first day and return in time for supper on the fourth. Three uncooked lunches were planned. Sandwiches for the first day were to be made up in advance. It was left to individual taste to choose the kind of cereal. Weight was an important factor, and the total weight, at the beginning of the trip, of all of the food items was 23 pounds, that is, something less than eight pounds per person.

MENUS

FIRST DAY

Lunch	*Dinner*
Sandwiches	Dried vegetable soup
Chopped nuts and cottage cheese	Oatmeal crackers
Shredded cocoanut and orange juice	Flapjacks
Pickles	Brown sugar
Oranges	Tea
Chocolate bars	

SECOND DAY

Breakfast	*Lunch*
Stewed prunes	Dates and raisins
Cooked cereal	Peanuts
Dried milk	Oatmeal crackers
Bread	Butter
Butter	Oranges
Bacon	Chocolate bars
Coffee	

Dinner	
Sardines	Bisquick
*Spaghetti (dried and cheese)	Butter
Pickles	Jam
	Tea

THIRD DAY

Breakfast	*Lunch*
Cooked cereal with raisins	Dried vegetable soup
Dried milk	Oatmeal crackers
Flapjacks	Butter
Butter	Square of cheese
Bacon	Canned peaches
Coffee	Chocolate bars

Dinner	
†Dried beef, creamed with dried milk	Butter
Cornbread	Brown sugar
	Tea

FOURTH DAY

Breakfast	*Lunch*
Dates	Dried figs
Cooked cereal with dried milk	Walnut meats
Bisquick	Oatmeal crackers
Butter	Canned grapefruit
Bacon	Chocolate bars
Coffee	

*Cook spaghetti in water, then add cheese and some milk.

†Dried beef may be served on or with oatmeal crackers.

ORDER LIST

1 small loaf bread for packing
1 small loaf white bread for sandwiches
1 lb. American cheese
Chopped nuts, cottage cheese, shredded cocoanut and orange juice—filling for sandwiches
½ pt. bottle pickles
9 Oranges

12 Chocolate Bars
Dried vegetable soup
1 lb. Oatmeal crackers
1 Package Pancake flour
½ lb. Brown sugar
3 Tea Bags
½ lb. Dried figs
1 Package cooked cereal (e.g. Ralston)
½ lb. Dried milk (1 cup)
4 cups Bisquick (makes 16 biscuits)
½ lb. Bacon
¼ lb. Coffee
¼ lb. Dates
½ lb. Raisins
3 small packages salted peanuts
1 small can sardines
½ lb. dry spaghetti
1 lb. Dried beef
1½ pt. wax carton with jam
1 No. 1 can peaches
½ cup salt
¼ lb. white sugar
2 cups Corn Bread mixture
1 No. 1 grapefruit sections
¼ lb. walnuts
½ lb. dried prunes
Total weight—23 pounds

No matter how many times we may climb our favorite mountains during the summer, we miss the best fun of all if we do not occasionally make a special expedition to their summits in autumn, winter or spring. To arrive at a favorite lookout in October to find the forested slopes below a brilliant blanket of crimson and gold; to start for a high summit on June first and discover that you are apparently walking backward through the calendar with tree leaves becoming smaller and flowers earlier, until once on top the season seems to be mid-April with leafless trees and lingering snowbanks; and, greatest thrill of all, to win your way on webbed feet through ever deepening snow until you stand on the snowy, wind swept peak with an endless expanse of snow covered lakes and mountains around you, are worthwhile lasting thrills that I wish you all may enjoy.

OUR SUN AND HIS NEIGHBORS

(Continued from page 36)

distance of about sixty-six trillion miles from the earth. Due to the difficulties of the problem star distances generally are uncertain by about twenty per cent, or one-fifth, of the distance measured. One cannot expect too great exactness in such difficult measurements. Although the distances that have been given may be, in the case of these near stars, uncertain to the extent of one or two light years at least the *order of distance* of the stars is known as well as their relative distances. It is a remarkable fact that within the enormous volume of space lying within a radius of about sixteen light years of the earth we know of the existence of only about thirty stars, and also that these stars differ tremendously from one another in brightness, ranging from twenty-eight times the brightness of the sun, for Sirius, to only one fifty-thousandth part of the sun's brightness for the little star Wolf 359. Although we are certain that we have found all the *brighter* stars that are our nearest stellar neighbors we cannot be certain by any means that we have found all the *fainter* telescopic stars close to us in space, or how many dark stars there may be, stars so feebly luminous that they cannot be seen in any telescope. Apparently, though, there is ample space in the heavens for all stars including our own, luminous or non-luminous to pursue their individual journeys for millions upon millions of years without serious collisions or catastrophes, though sooner or later judging from the comparatively frequent outbursts of Novas this may be the fate of most stars, if not all of them.

In the early part of July there will be five planets visible in the evening hours. Mercury reaches its greatest elongation east of the sun on July 2, and it should be possible to pick it up in the western sky about ten degrees above the horizon for a week or more early in the month.

Venus, also, is now in the western sky at sunset, and on July 12 Mercury and Venus will be in conjunction. At that time Venus will be about four degrees north of Mercury. This should furnish an opportunity to find Mercury readily with the aid of Venus.

Jupiter is now in Virgo and well over in the western sky at sunset. Mars is also in the evening sky in Virgo and sets about three hours after the sun the middle of July. Spica, which is a few degrees southeast of Mars, and the two planets, Jupiter and Mars, which have kept not many degrees apart for months now, form an interesting group in the western sky in the early evening hours. The changes in the relative positions of Mars and Jupiter since the beginning of the year have given us an object lesson in how the planets pursue their individual paths among the stars and constantly change their positions with respect to one another and the fixed stars. Both bright and conspicuous planets, they have attracted much attention in the past six months, keeping nearly all of this time in the same constellation but varying their relative positions noticeably. The distance between the two planets is now rapidly increasing and Jupiter will disappear from the western sky several months before Mars.

Saturn also is in the evening sky this month and in fine position for observation throughout the night. On July 15 it rises in the east about an hour after sunset in the constellation of Capricornus.

Scorpio is now the most conspicuous constellation in the southern sky and is followed by Sagittarius, easily recognized by its little inverted dipper, in the southeast. Bootes with its brilliant Arcturus, Corona, and the huge Hercules, lying between Corona and the beautiful Vega, in Lyra, are now near the zenith. The Northern Cross in Cygnus, and Aquila, with its first magnitude star Altair, one of our near stellar neighbors, are now visible in the eastern sky in the Milky Way, which stretches high across the eastern sky from Cassiopeia in the far north to Scorpio in the south.

What of Cloudland?

Eleven years have passed since the appearance of the first edition of *The Book of the Sky*. Since that time many thousands of people have travelled among the clouds, voyaging millions of air miles over all of the world. In that same period old ideas have been confirmed or amended and new ones have been developed about the atmosphere that more immediately surrounds our earth. In the light of this Dr. Matthew Luckiesh of the General Electric Company has revised and enlarged his original volume, supplying new illustration and seven new chapters. It is now a Baedeker of the air, written with charm and freshness in a manner to be of interest to the general reader as well as to the air pilot and the meteorologist. It is published by E. P. Dutton and Company and sells for three dollars.

Missouri Snakes

We were particularly interested to receive the copy of the *Nature Study Bulletin*, published by the Department of Public Instruction of St. Louis, Missouri, and to find it devoted to illustrations and descriptive text about the snakes of Missouri. The entire issue is devoted to these snakes in the hope of correcting unwarranted fear of snakes, to inform as to the poisonous ones, to bring out the economic importance of snakes and to describe their beauties of color and design. There is only too little good reptile material designed along these lines available. We felt that, since much of the material is of interest and value outside Missouri, some of our readers might wish a copy of it. We find that for ten cents sent to Lewis M. Dougan, Field School, 4466 Olive Street, St. Louis, Missouri, a copy may be had as long as a rather limited supply lasts.

Jan Welzl Again

Readers of true tales of adventure and exploration were given a treat in *Thirty Years in the Golden North* in which the Czech, Jan Welzl, told an amazing story. Now comes *The Quest of Polar Treasures*, containing more experiences of peril in lands about which we are quite content to read and to contemplate from the softness of our special easy chair. It is fascinating stuff, set down for the adventurer by Bedrich Golombek and Edvard Valenta and translated from the original Czech by M. and R. Weatherall. The former two report that they have carefully checked and rechecked the recollections of their storyteller, going to long ends to do this so amazing are some of the stories and so acute is Welzl's ability to recreate his experiences. The publishers are, again, the Macmillan Company and the book is listed at two dollars.

Books about Florida

Botanically speaking, Dr. John Kunkel Small, head curator of the museums and herbarium at the New York Botanical Garden, knows Florida as does no other. For some reason we have not before called attention to two of his books about the Peninsular State. One of these is *Ferns of Florida*, in which each of 107 species of ferns is described and illustrated. This is a volume into which is packed information of value to the student of botany and to the amateur naturalist. Florida boasts more ferns than any other state in point of variety and they are available for study and collecting at all times of the year. The other volume is entitled *From Eden to Sahara*, with a sub-title of "Florida's Tragedy." It is a continuous story of botanical exploration of several thousand miles of the state, and the tragic part deals with the wholesale devastation of plant life through carelessness, thoughtlessness and vandalism. It is a most interesting botanical history of what Florida is and might have been. Both of these books are published by The Science Press, Lancaster, Pennsylvania.

Another by Mrs. Kenly

Those who enjoyed the bluejay story in our March issue—and these, we gather, were legion—will be delighted to hear of the appearance of another of Julie Closson Kenly's charming Nature books. This time it is entitled *Wild Wings*. It is a stimulating bird book, richly informative and designed to intrigue the interest for bird study. Thanks to Mrs. Kenly's easy style, it has no touch of the cut-and-dried textbook, which, indeed, it is not. With this fourth Nature book, then, the author adds to her stature as a Nature writer. Her publisher is D. Appleton and Company, and the book sells for $2.50.

Training Wild Animals

The Big Cage by Clyde Beatty and Edward Anthony is a most interesting book. It is the story of the former's experiences in the training of wild animals, and in exhibiting them and their accomplishments. It is both a narrative of personal experiences marked with many thrills and a recitation of method. We were specially interested in Mr. Beatty's assertion that he much prefers to work with and train animals from the wild rather than those who have been bred in captivity. We were also interested in Mr. Beatty's observations on the often-voiced question of alleged cruelty to wild animals in training.

"There is the familiar story about those who jab their animals with pointed steel rods to make them perform. I'd like to see any one do this to a wild animal—especially in the case of the great cats—and get away with it . . . the day of reckoning would come," Beatty says.

Mr. Beatty adds that his winter quarters in Peru, Indiana, are open to the public and thousands of people have watched him work at training, "and if anyone has ever seen me resort to cruel practices, I'd like to have his name and address." We will confess that Mr. Beatty's methods of training were a surprise to us and they reveal a real understanding of wild animals. The book is illustrated by some splendid action pictures. It is published by the Century Company and sells for $3.50.

Battling the Insects

Wars between peoples are more spectacular and more publicized but they are of hardly less significance economically than the constant struggle between man and insects. The many battlefronts of this war and the tremendous cost and importance of it are set forth most interestingly and concisely in *Insects—Man's Chief Competitors* by W. P. Flint and C. L. Metcalf. Here we find summarized the great increase in our knowledge of insects and what they do, an increase which has been greater during the last century than during the rest of man's history. It is a knowledge born of the necessity of self-protection, and reflects the fact that man himself has been a heavy contributor to the situation by his own upsetting of the balance of Nature through the destruction of bird life, his greatest assistance in the war against insect depredations. This significant little book is published by Williams and Wilkins and sells for one dollar.

NATURE IN PRINT

As a convenience to readers to whom book stores are not easily accessible the books reviewed in this department of Nature Magazine may be ordered through our own book department.

Forestry in Schools

A significant contribution to forestry education through the public schools has been made by the University of Michigan through the compilation by E. V. Jotter, assistant professor of forest extension, of a correlation for elementary grades entitled *Forestry and School Studies*. This book, a paper-backed volume of 128 pages, contains twenty lessons outlining for the teacher a course which, if properly applied, should create a real appreciation by the rising generation of the importance of trees and forests. The lessons are cleverly designed to be worked into studies of arithmetic, geography, language, Nature study, history and drawing, thus adding a new and tangible vitality to these courses. The forestry course provides the teacher with questions in these various main courses and collateral references for outside reading, prominent among which are *The Forestry Primer* and *The Tree Planting Book* published by the American Tree Association. While, naturally, Michigan has been the State in mind in the working up of this course, it is easily adaptable to any part of the United States. Mr. Jotter is to be highly complimented upon his work, which reflects long and careful thought and preparation; and much is due the University of Michigan for making it available. This book is available free to Michigan teachers, but interested readers outside that State may obtain copies for 25 cents from the School of Forestry and Conservation, University of Michigan, Ann Arbor, Michigan.

Forest Bankruptcy

Sounding a clear note of warning to the people of this country, Colonel George P. Ahern's *Forest Bankruptcy in America* makes its appearance at a peculiarly appropriate time. Appropriate because President Roosevelt, like his great conservationist relative, has recently focussed the spotlight of public attention on the vital question of forest perpetuation as it has not been done since the days of "T. R." President Roosevelt brings forward the fundamental problem of land use, and Colonel Ahern, in his arresting book, shows the pernicious results of three centuries of land misuse.

A thought-compelling and disturbing book. In his straight-from-the-shoulder way, Colonel Ahern points out, state by state, the results of our blundering patchwork, crazy-quilt pattern of past forest policy, our doctrine of timorous expediency, our lack of courage and leadership, and, above all, our inability to take any definite stand in combating the progressive devastation of our forests.

The author, after three years of labor, has produced something not hitherto existent in conservation literature—a clear, readable, and non-technical account of the forest situation as it exists in each of our several states.

The publisher is the Green Lamp League, Washington, D. C., and the price is two dollars. T. G.

Bermuda's Fishes

Another and a distinguished addition has been made to the fine list of natural history field books published by G. P. Putnam's Sons. It is *Field Book of the Shore Fishes of Bermuda* by William Beebe and John Tee-Van. The subject is a colorful and a varied one, and the authors, in this immediate volume, have sought to lay down a basis for further detailed work with and study of the shore fishes of this Atlantic island. Dr. Beebe, of course, has roamed about under water off the Bermuda coast and has a nodding acquaintance with many of the fishes in their own element. Mr. Tee-Van is a member of Dr. Beebe's staff. The book is brought out under the auspices of the New York Zoological Society. It is illustrated in color and in black and white. The price is $3.50.

Insects

Drawing upon the fine material used in *Western Nature Study*, Gayle Pickwell, Carl D. Duncan and Karl S. Hazeltine have collaborated in the production of *Insects*, a splendid volume on entomology for teachers, students and all those interested in the insect world. The general treatment accorded the subject is most interesting. The book is divided into twenty chapters, treating, for example, with structure, growth, foods and feeding habits, reproduction, protection, voices, control, and so forth. Excellent pictures add to the text and the whole work is brought out in what is known as the Western Nature Study Series. It is published for the Natural Science Department of the San Jose Teachers College by Suttonhouse. The price is three dollars.

National Park Fauna

In the National Parks of our country we have a great national zoological park where wild life is protected, and within these boundaries, at least, we are preserving birds, mammals and flora for future generations. The importance of these protected natural resources of wild life is, in fact, only just being realized. In this connection *Fauna of the National Parks* is a timely publication.

In its production George M. Wright, Joseph S. Dixon and Ben H. Thompson have collaborated. The booklet is described in a subtitle as a "preliminary survey of faunal relations in National Parks." It is the first of a series of reports which will fit admirably into the already splendid program of Nature Education in the Parks—a program, incidentally, which we trust will not be sacrificed to economy. We can ill afford to retrace the steps already taken. The booklet is available from the Superintendent of Documents, Washington, D. C., for twenty cents.

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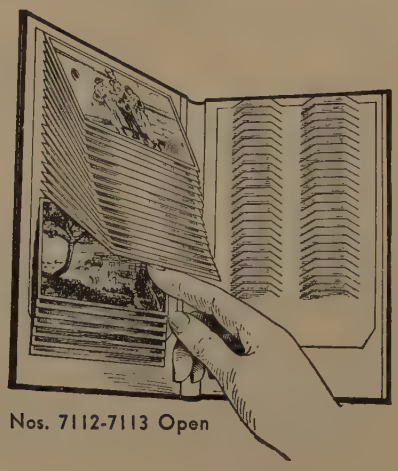

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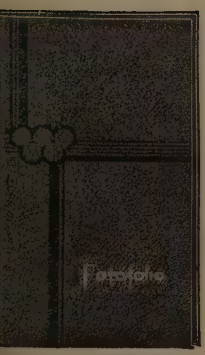

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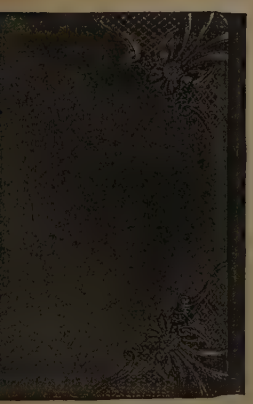

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GARDENS AND GARDENING

Edited by

ROMAINE B. WARE

Along about this time of the year there are a lot of home gardeners who say they "never have any luck with flowers." They tell you that "everything grows for Mrs. Jones, but somehow my plants get just about so far and then die." Poor luck is their alibi, but if you could know the real reason you would find it far deeper than that. Maybe they went away over the week end and their seedlings, previously doing so well, got too dry and never fully recovered. Maybe they bought just any old seed and naturally got an indifferent lot of plants. Possibly it is soil preparation, poor drainage, lack of humus in the soil, or any one of a dozen other causes. You can safely wager it is not luck, because plants follow definite rules, and if you learn and observe them you will get results. If you ignore them you will also get results, but not the kind desired.

Plants have certain requirements. Some like full sunlight and dry soil; others want shade or partial shade and in full sunlight will perish. Some succeed in most any soil while others are finicky, insisting on a certain degree of acidity or alkalinity. Countless factors enter into the success of every garden, and while the experienced gardener does much of his work without conscious thought as to details he follows the rules just the same. You will not become an expert gardener in one season but gradually you can learn the needs of the different plants and in the end succeed.

From about this time on until cool weather arrives it is the foresighted gardener who succeeds. The short-sighted ones soon lose out. Some of them "sprinkle" their gardens out of existence. Every day, if they don't forget it, or the mosquitos are not too bad, or it is not too hot, they "sprinkle" the garden with the hose, wetting everything in sight. And, in fact, it is right here that they do the greatest harm. It is the things that are not in sight, the roots of the plants, that need the water most and these are generally overlooked. When you water your garden, be sure there is enough water supplied to wet down eight inches to a foot. Simply sprinkling the surface does more harm than good because it encourages roots to grow close to the surface. Then along comes a dry spell and watering is neglected a few days with the result that the plants are seriously injured.

Supply yourself with some type of sprinkler that will water a large area at one time, spreading the water quite evenly. Then let it go in one spot till that section is well watered. Move it to another and do the some thing and so on until the entire garden is thoroughly wet. Once a week is often enough to water any given section if done thoroughly. There are numerous devices on the market for watering gardens and you do well to look into them.

Spraying, too, is an important part of successful gardening, although many try to get by without doing it and find results quite uncertain. They will all have some kind of an alibi but in the end you find that spraying would have done the trick.

Many of the spray material manufacturers put out spray-charts which they will be glad to send free of charge. There is no excuse for neglect to spray if you really want a good garden. It is neither a costly nor difficult task if one will just learn what is needed.

Hedge shearing is one of the tasks that, if neglected, makes a good garden look ill-kept and in these days when good tools are available to do the job there can be no excuse. A new electric tool is out this year called the Hedgshear. It cuts the necessary trimming time down to one-sixth of what it took by the former methods. Be careful in trimming your hedges to keep the top narrower than the lower part; otherwise your hedge will make poorer and poorer growth at the bottom. Regular shearing, feeding, watering and cultivation are important in the care of hedges just the same as with other plants.

During the growing season is a good time to attend to labeling the plants in your garden. One of the joys of any garden is to know just what every plant variety is named, and unless you have them properly labeled it is difficult to keep tabs on them. Countless kinds of labels are on the market. A new one called the "Attracta" is ideal for the rock garden or other places where a small label is needed. Test it out, and other kinds as well.

It is not too late to plant water lilies which are sold as plants, already started, and can be set out at most any time during the growing season. They grow most vigorously during warm weather. Give them the richest soil you can get with plenty of well-rotted barnyard manure in it and they will reward you with vigorous growth and plenty of bloom.

You will find it worth while to keep a supply of potted plants coming on most of the time to fill in blank spots which inevitably develop in even the best of gardens. That these reserve plants in pots may be brought along with the least attention possible, plunge them to their rims in the soil and they will be ready to set out when needed. A wide variety of plants may be handled this way and your garden will be materially the better.

Avoid cutting the lawn too close in hot weather. For best results, cut frequently and let the clippings lay. They promptly work their way down to the surface and act as a mulch, protecting the surface roots from the sun and conserving moisture so necessary to plant growth. Mulching is of real benefit to lawns, and peat moss, the pulverized kind, is good for this job. Make a top dressing of two-thirds pulverized peat moss and one-third garden loam, add a couple of pounds of tankage and four to six pounds of dried sheep manure to each bushel. Pass this through a screen to make fine and spread it over the lawn surface to a depth of a half inch or an inch. Rake in well to get it down to the soil. Water thoroughly and your lawn will soon take on a new lease of life. Peat moss is invaluable in the garden once you become familiar with it.

Few gardeners think of summer as a planning season. They do most of this in winter and spring, but summer is a good time too as everything is then in full leaf and it is easy to see just what is needed. As you stroll through your garden, enjoying its color and fragrance, study the ways

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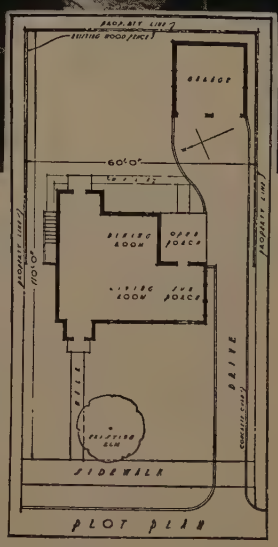

PLOT PLAN

REGARDLESS OF HOW HUMBLE a home may be there is only one *best* landscape plan that will exactly fit your plot. Such a plan, however, calls for the coordination of many things—the architectural style of the house, topography of the land, orientation, adaptation of planting materials and a number of other elements.

Those of us who have been amateur gardeners for a few years realize that a great deal of specialized knowledge is necessary in order to develop the information about these subjects into an interesting garden design. In fact the more most of us strive the more we realize what amateurish and unsatisfactory results our efforts usually produce.

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Make a rough plot plan of your property similar to small line inset immediately above, indicating existence of slopes and their extent. Photos of front, rear and both sides of house as well as photos from various rooms and also of objectionable features you may want hidden. Locate house on plot, showing walks, drives, trees, shrubs, etc. Locate windows on first floor. State color of house, trim, blinds, etc. State special features wanted such as—Drying yard, play yard, rock garden, vegetable garden, water pools, tennis courts or other features. Indicate North and South. Advise type of soil—sand, clay or loam. Try to make plan to scale—⅛ or ¼ inch to foot. In correspondence write on one side of paper only. Place name and address on back of each sheet of paper and photo.

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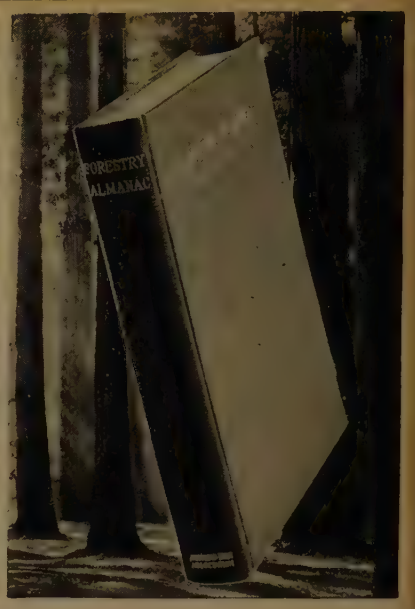
you can improve it. Don't imagine that improvements are necessarily costly because many things can be done gradually and in the end you will have a more delightful garden. Maybe your garden needs a shelter house where you can relax and enjoy a vista. Many types are on the market or you can build your own. The first thing is to realize the need and decide the best place for it. Maybe the garden needs a bird bath, sun dial, pergola, arbor-covered seat or countless other furnishings. Only by studying the problem from countless angles can you decide what will be best. Do not overdo it as too much is as bad as none at all.

Study the weak places in your plantings and then visit the best nurseries in your section and see what they have or can suggest that will remedy the defects. Don't be afraid to dig out something that is not doing well or is out of place and replace with a better thing. Remember also that no matter how perfect your garden, it can be improved and it is up to you to see what is needed. Just as soon as you decide it is completely finished and cannot be any better, then your garden will begin to slip back. They never stand still.

Right now you should be planning new iris plantings to be made this summer. Dig out the old standbys you have had so long. There are so many new and better kinds on the market today that you should not waste limited space upon anything that is not a bit better than the ordinary. And these better things are not necessarily costly, especially this year when prices are down to bed rock. Get several of the iris specialists' catalogs and study their offerings. Let them tempt you into spending a little cash on new things. Plant some potential thrills for spring, 1934.

During the next month is a good time to start perennial seeds for plants to bloom next year. Make yourself a small cold frame so that growing conditions may be more easily controlled and sow the seeds in it. A dollar's worth of seed will produce plants that could not be bought for twenty or thirty times that next spring. Besides you will have the thrill of growing your own and surely there is nothing more satisfying. Try out some of the new things, some of the oddities not seen in every garden. Of course you may pick some that are not all they seem to be according to their descriptions but the fun of trying new things is very worth while. Many bulbs can be raised from seed, also countless rock plants and even shrubs and trees. Once you get the habit of starting things from seed, you have opened the door to one of Nature's grandest adventures. Gardening is an adventure in every way but growing plants from seed is the greatest thrill of all. Why not give yourself a treat?

EDITOR'S NOTE—Why not let the Garden Department of Nature Magazine help you solve your problems as it has done for countless readers during recent months? Our garden library and nearly five hundred catalogs are at your service, to answer questions, to aid you with advice. We will be glad also to hear of your garden triumphs. Tell us of your successes and maybe they will help others have better gardens. Copies of the bulletins on Care and Selection of Garden Roses and Planting Your Bulbs are still available to readers for a three-cent stamp each. A new practical garden bulletin is now being prepared and will soon be announced.



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In Memoriam

The issue of April 21, 1933, of the *Vineyard Gazette,* published weekly at Edgartown, Martha's Vineyard, Massachusetts, is historic. Centered on the first page is a three column illustration with the caption: "I am the last of my race. My name ends with me." It is a picture of a heath hen, and the major portion of this issue of the newspaper is dedicated to that bird now gone to join the ranks of the extinct species. The history of the heath hen is traced, its life history is described and the losing struggle to save it from extermination is reviewed. The Editors Hough chronicle the passing of the bird in this splendidly edited issue and with an editorial, the introductory paragraph of which we quote:

"Now we know there are degrees even in death. All around us nature is full of casualties, but they do not interrupt the stream of life. When most living things die, they seem only to revert to the central theme of existence from which they were temporarily detached. There is a spirit of vitality everywhere which enfolds the dead with a countenance of consolation, and bestows upon the living races more than has been taken away. But to the heath hen something more than death has happened, or, rather, a different kind of death. There is no survivor, there is no future, there is no life to be recreated in this form again. We are looking upon the uttermost finality which can be written, glimpsing the darkness which will not know another ray of light. We are in touch with the reality of extinction."

American Lotus Protected

After actively campaigning in behalf of the lotus, the Burroughs-Audubon Nature Club of Rochester, New York, has had its efforts crowned with the passage by the State Legislature of a measure protecting the flower against extermination. This flower grows in Great Sodus Bay in New York, and has been the victim of indiscriminate gathering by picnic parties in this region.

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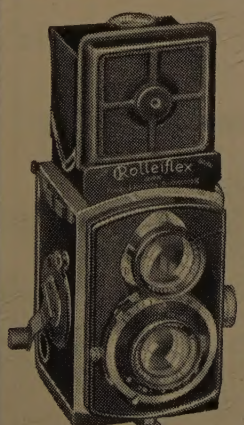

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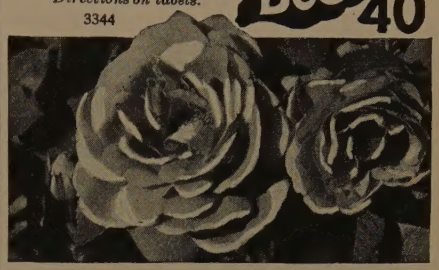

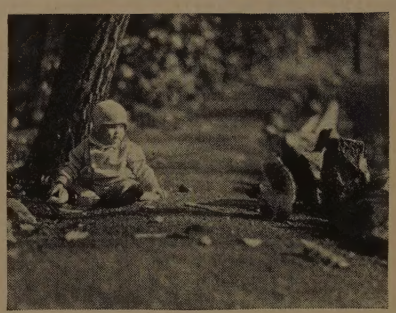

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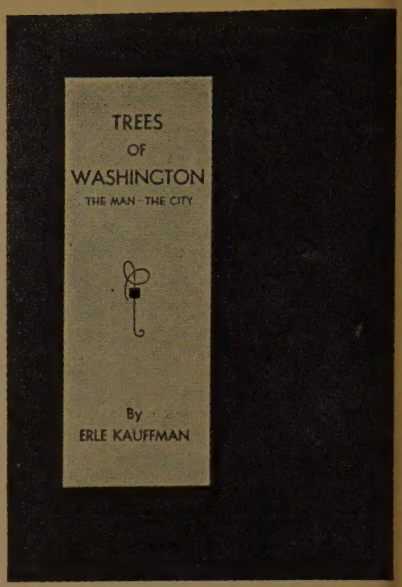

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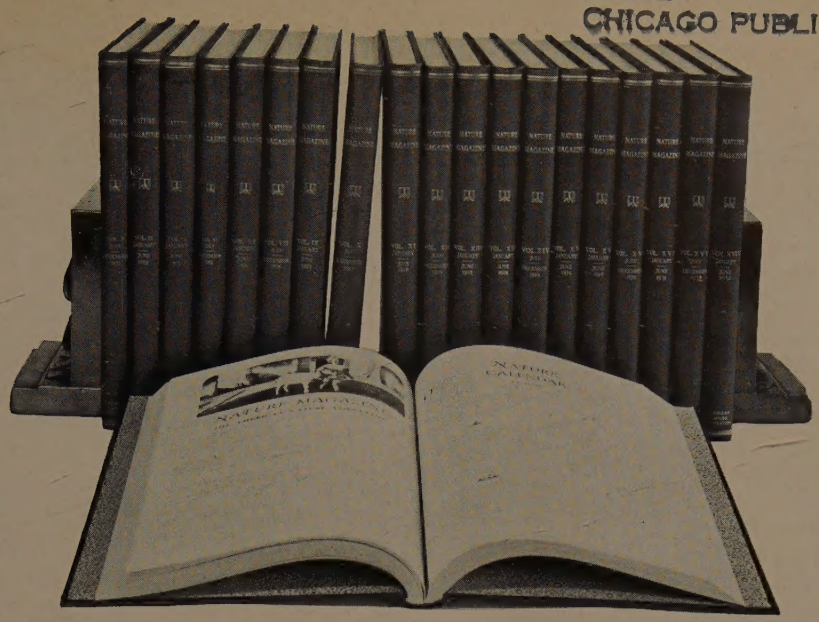

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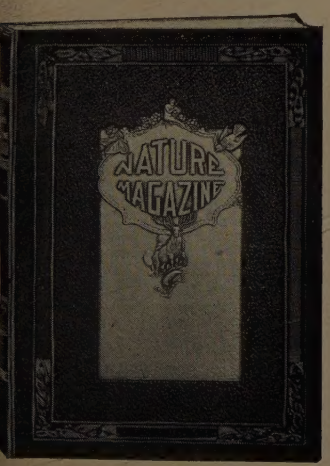

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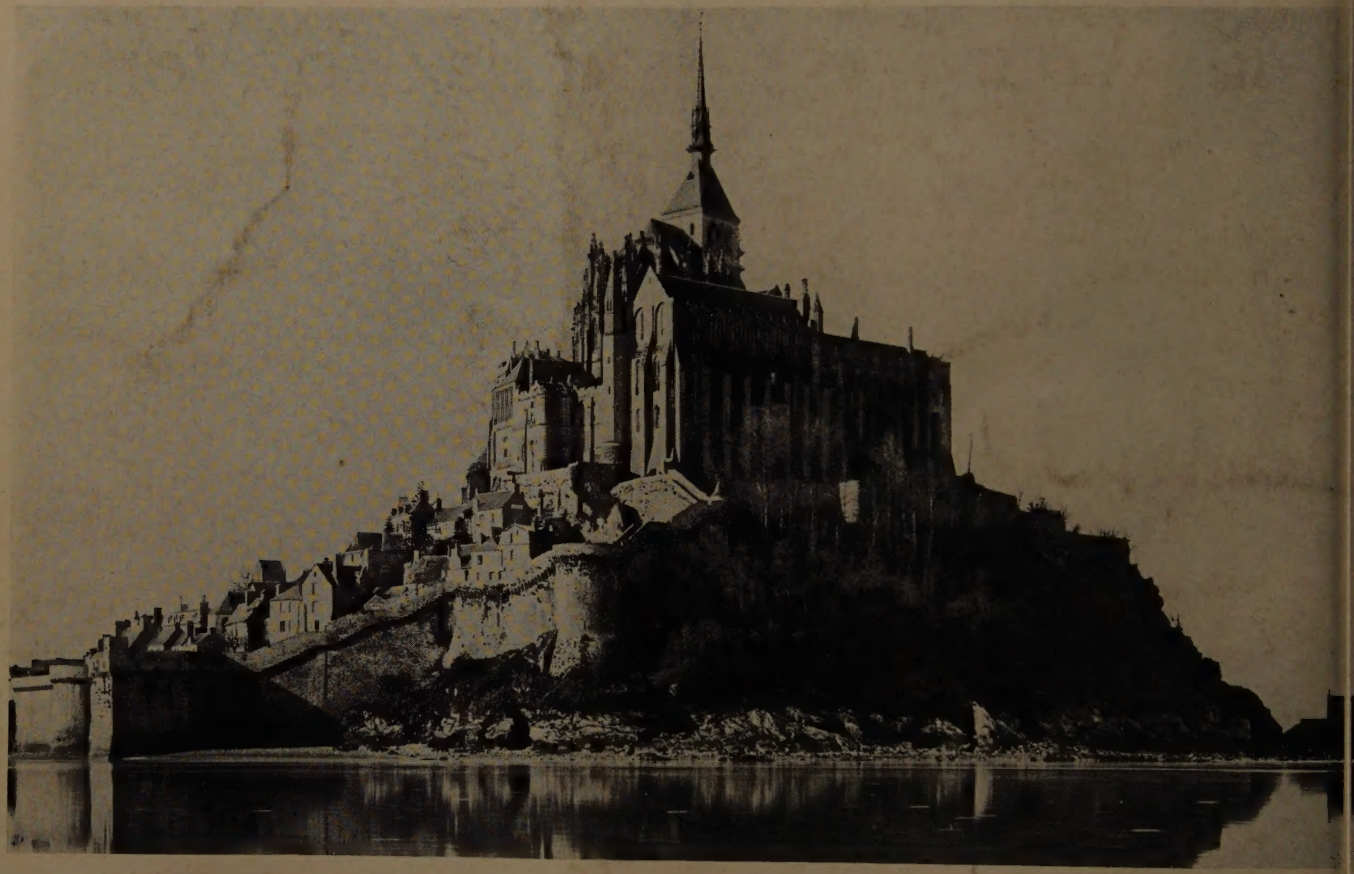

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